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An Asian child is one of the thousands who bear the pockmarks of smallpox. An article on the eradication of smallpox appears on pp. 771-778.

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

ARTHUR S. FLEMMING, *Secretary*

PUBLIC HEALTH SERVICE

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An evaluation of narcotics controls discloses that our Nation's statutes are not sufficiently flexible in view of new discoveries in synthetic analgesics. Suggested changes include a redefinition of addiction and uniform national and international laws.

Addiction Liability and Narcotics Control

NATHAN B. EDDY, M.D., and HARRIS ISBELL, M.D.

AMONG the most effective measures for the prevention of drug addiction are the Federal laws and international treaties controlling the production and distribution of the drugs of addiction and the source materials from which these drugs are derived. The application and administration of these laws have steadily become more complex. A large number of synthetic drugs with pharmacological effects and addiction liability similar to that of morphine have been discovered and have created some difficult problems of classification and control. It is now also known that substances, such as the barbiturates and the amphetamines, covered by the food and drug but not by the narcotic laws, are susceptible to abuse and may produce a different addiction from that caused by the opiates. It is the purpose of this paper to review the historical origin of the present narcotic laws and to discuss changes in them which seem desirable in the light of recent knowledge.

Definition of Addiction

In 1950, at the request of the Commission on Narcotic Drugs of the United Nations, the Ex-

pert Committee on Addiction-Producing Drugs of the World Health Organization drafted a definition of addiction (1). The committee said, "Drug addiction is a state of periodic or chronic intoxication, detrimental to the individual and to society, produced by the repeated consumption of a drug (natural or synthetic). Its characteristics include: (1) an overpowering desire or need (compulsion) to continue taking the drug and to obtain it by any means; (2) a tendency to increase the dose; (3) a psychic (psychological) and sometimes a physical dependence on the effects of the drug."

In its third report (2) in 1952, the expert committee wrote an explanation of the characteristics of addiction designed particularly to express its view on a distinction between addiction and habituation. In 1957, to clarify further this distinction, the expert committee reworded its definition of addiction without material change in its meaning (3).

This definition received some acceptance but also much criticism. It was not meant to be pharmacological, nor strictly speaking scientific, but practical, and was intended to include the diverse substances currently under international narcotics control. State and national narcotics laws and regulations and international narcotics conventions are designed to prevent or at least limit abuse of cocaine and marihuana as well as of opium and the potent analgesics. Though all of these substances are commonly and loosely termed narcotics, their properties

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differ so widely that they are similar only in being subject to abuse and in creating social dangers. Of necessity, any definition attempting to cover all of them had to be very broad.

National Control

When control was first considered (1909-12) and for a considerable time thereafter, only cocaine and opium and its alkaloids were taken into account. Their abusive use was recognized and considered of sufficient importance to warrant strict control, even at the expense of placing a burden upon drug manufacturers, pharmacists, and physicians, as well as upon the government which had to implement the control. Relatively few individuals abused both opiates and cocaine, the effects of which are different and in some respects opposite; yet both were called narcotics and both were subjected to the same control measures.

An excellent chronological review of the steps in the development of national and international control of narcotic drugs was published in 1953 (4).

Merely listing the principal acts of Congress on this subject with their chief intent will indicate the progress of events and the development of thought on the problem of control:

February 9, 1909. Prohibition of importation of opium and its preparations and derivatives except for medicinal purposes and absolute prohibition of importation of smoking opium.

January 17, 1914. Prohibition against exportation of opium and cocaine and salts, and derivatives and preparations thereof, except to a country which regulated the entry of such drugs; absolute prohibition of exportation of smoking opium.

January 17, 1914. Prohibitive tax upon opium manufactured for smoking purposes.

December 17, 1914. Harrison Narcotic Law, an internal revenue measure by tax and registration limiting the availability of narcotic drugs to medical and scientific uses, and regulating production, manufacture, and distribution, through channels of medical supply to the dispensing registrants, the qualified practitioner, and druggist.

May 26, 1922. Narcotic Drugs Import and

Export Act, an extensive revision of the act of 1909 authorizing the importation of such quantities only of opium and coca leaves as were found to be necessary for medical and legitimate needs. Importation of any form of narcotic drug except crude opium and coca leaves was prohibited. Exportation of manufactured drugs was permitted under a system of control designed to assure their use for medical needs only in the country of designation.

June 7, 1924. Amendment to the Narcotic Drugs Import and Export Act prohibiting the importation of opium for the manufacture of heroin.

June 14, 1930. An act establishing the Bureau of Narcotics in the Department of the Treasury.

August 2, 1937. The Marihuana Tax Act. Imposition of registration and occupational tax on all persons who produced, imported, manufactured, sold, or transferred marihuana.

August 9, 1939. Contraband Seizure Act, authorizing confiscation of any vessel, vehicle, or aircraft used to facilitate transportation and so forth of contraband narcotics or marihuana.

December 11, 1942. Opium Poppy Control Act, prohibiting the growth of the opium poppy in the United States, except under special license issuable when need is shown for domestic production for medical and scientific uses.

July 1, 1944. A statute making the Federal narcotic laws applicable to pethidine (meperidine, Demerol) under the statutory designation "Isonipeccaine."

March 8, 1946. The Opiates Act, or Robertson Amendment, establishing a general procedure for the expeditious application of control measures to any drug found to be dangerous from the addiction-liability standpoint.

1955-59. The Karsten bill, designed, among other things, to implement our obligation under the 1948 protocol to bring new substances under narcotics control. This bill is still pending. Consideration is being given to its possible amendment looking to greater flexibility in our system of narcotics control, tailoring, so to speak, the degree of control to the degree of risk to public health. Among those giving thought to the desirability of such amendment, the Committee on Drug Addiction and Narcot-

ics of the National Research Council discussed the problem at length at its 20th meeting, January 11, 1959, and passed unanimously a resolution embodying its views (5).

International Control

The first effective effort toward obtaining international action to control the traffic in opium and the dangerous drugs obtained therefrom was the conference of the International Opium Commission convened in Shanghai in February 1909, on the initiative of the U.S. Government. The successive steps or agreements on international narcotics control, again reflecting the development of thought on this problem, have progressed as follows:

International Opium Convention of 1912. Designed to bring about the gradual suppression of the abuse of opium, morphine, and cocaine, as also of the drugs prepared or derived from these substances which give rise or might give rise to similar abuses. The contracting parties agreed to enact effective laws or regulations for the control of the production and distribution of raw opium. A less definite obligation was imposed with respect to smoking opium, and the contracting parties' best efforts were to be used with respect to morphine and cocaine and their salts to restrict their import and export to authorized persons and to enact laws limiting exclusively to medical and legitimate purposes the manufacture, sale, and use of these dangerous drugs.

Geneva Narcotics Convention of 1925. Intended to impose somewhat more specific obligations with respect to control of national and international trade. It established the Permanent Central Opium Board to watch continuously the course of international trade in the drugs covered by the 1912 convention, collect and examine statistics, and obtain and communicate to all parties explanations of apparently excessive accumulations of the dangerous drugs in any country.

Convention of 1931. Limited the manufacture and regulated the distribution of narcotic drugs by requiring all countries, whether or not parties to the convention, to supply annual estimates of their needs of stated derivatives of opium and coca leaves, based solely on medical

and scientific requirements. Thereafter, each country was obligated to limit its manufacture of each of the drugs in accordance with its estimate and to supply periodically to the Permanent Central Opium Board statistics of actual manufacture, consumption, importation, and exportation of those drugs. In other words, the convention contemplated the adjustment of world manufacture to legitimate world demand, the control of all channels of distribution, both national and international, and provision for a recording system of all narcotic drug operations. It entrusted to international organizations the task of supervising and coordinating throughout the world. The convention specified the drugs to be controlled and made some provision for additions to the list.

Protocol of 1946. Transferred to the Commission on Narcotic Drugs of the United Nations Economic and Social Council the functions previously carried out by the Opium Advisory Committee of the League of Nations.

Protocol of 1948. Established an international procedure, analogous in principle to that of our Opiates Act of 1946, whereby new drugs found to have dangerous addiction liabilities are promptly brought under the control imposed by the 1931 convention, the definitive finding in this case being made by the World Health Organization.

Opium Protocol of 1953. Designed to limit definitely the production of opium to medical and scientific needs and to establish the areas of production and sources of world supply. This protocol has not yet become effective.

Single Convention. Originally intended to incorporate into a single agreement by codification the provisions of the various international narcotics conventions but actually undergoing elaboration. It is still in the drafting stage.

Need for Flexibility

It is apparent that, initially, thought and effort toward narcotics control were centered upon the crude materials, opium and coca leaves, or upon the potent drugs obtained from them, morphine and its derivatives and cocaine. In the United States marihuana was added to the list of substances controlled because of evidence

of widespread abuse. The picture changed with the discovery and introduction into medicine of the first synthetic morphine-like pain-relieving drug (pethidine, meperidine, Demerol), the tremendous impetus to research on analgesics which followed that discovery, and the important advances which have been made in the study of addiction. It would seem desirable to consider how the picture has changed and to try to understand the implications of the change.

Pethidine was but the first of a very large number of substances prepared entirely by synthesis in the laboratory which exhibited in animals and man wide differences in analgesic and physical dependence properties. These substances also are widely different in chemical structure. Some are built upon moieties of the morphine molecule. Others differ so greatly in chemical structure that the tentative relationships of structure and analgesic action described by Braenden, Eddy, and Halbach (6) as recently as 1955 cannot always be discerned.

It is well recognized from clinical experience and direct evaluation experiments under controlled conditions that substances derived from morphine differ in analgesic potency and addiction liability and present different degrees of risk to public health, ranging from the great danger of heroin, the main drug in the present-day illicit traffic in the United States, to relatively low risk with codeine, which with proper therapeutic use rarely results in addiction.

Examples of all the synthetic chemical types have been evaluated for addiction liability as well as for analgesic effect and have exhibited a range of activity from much greater than morphine to substantially less than codeine. In this connection the expert committee (7) has stated "that synthetic analgesic drugs differ from one another in addiction liability just as do drugs derived from natural sources such as opium; that members of each class must be considered individually with respect to inherent risk and therapeutic advantage; and that the risk of addiction through the use of synthetic drugs is neither greater nor less than the risk encountered through the use of morphine, related opium alkaloids, or substances derived therefrom."

For the natural alkaloids, that is, for sub-

stances which are modifications of morphine whether occurring in opium or produced in the laboratory, the 1931 convention recognized a difference and established groups I and II for which control regimens would be different. Group I was further subdivided into subgroup (a) comprising morphine and similarly addicting substances, and subgroup (b) comprising ecgonine, thebaine, and other drugs regarded as not themselves addicting but convertible into drugs capable of producing addiction. Group II was established to include codeine, dionin, and related substances, likewise then regarded by many as not capable of producing addiction but also convertible into addiction-producing drugs. The distinction was drawn between subgroup (b) and group II not on theoretical but on practical grounds, namely, that the drugs in group II were very extensively used in medicine all over the world, whereas those in subgroup (b) were hardly used at all by the medical profession (8). All measures of control were applicable to all drugs in group I (both subgroups), but a somewhat modified control was permitted for the drugs of group II. For the latter the substances themselves were controlled internationally in essentially the same way as those in group I with only minor modifications such as greater leeway in estimates of needs and other statistical matters. However, under the convention, compounds of the drugs in group II, if they were adapted to normal therapeutic use, were exempted from international narcotics control.

The U.S. laws do not recognize a distinction in the regimen of control such as that between group I and group II of the 1931 convention except insofar as specifically described preparations of not greater than specified concentration may be sold as conditionally exempt preparations without a narcotics prescription. These limited exemptions were authorized before the discovery of pethidine and the many other synthetics, and the Opiates Act of 1946 made no provision for their extension to a preparation of any synthetic. This situation must be discouraging to pharmaceutical manufacturers and may act as a deterrent to research programs designed to develop analgesics of low addictiveness. Since under present

conditions any such agent could be controlled only in the same manner as morphine, our narcotics laws are in a sense hampering the search for a nonaddicting pain-relieving drug.

Clinical experience and direct addiction experiments indicate that cocaine does not produce physical dependence, and abrupt withdrawal after prolonged use is not followed by an abstinence syndrome. In the amounts taken by addicts in the United States, however, cocaine can cause a dangerous psychosis, and taken chronically it causes tachycardia, insomnia, and anorexia with resultant impairment of nutrition. Cocaine does produce strong psychic dependence, and its prolonged use is undoubtedly detrimental, hence its control by the narcotics laws. Similarly, marihuana does not produce physical dependence manifested by a withdrawal syndrome. Here, too, control is exercised because of the harmful effects of the drug under conditions of abuse.

In recent years the Addiction Research Center of the Public Health Service Hospital at Lexington, Ky., has been investigating the possibility of development of physical dependence during prolonged administration of barbiturates, meprobamate, and similar drugs. It has been shown conclusively that physical dependence could develop when large doses of these substances were taken chronically and that a characteristic abstinence syndrome followed abrupt withdrawal (9-11). It was also shown, however, that no clinically significant degree of dependence developed in persons taking only 0.4 gram or less daily of secobarbital or pentobarbital, that is, two to four times the usual daily oral dosage (12). It is clear from the work at Lexington that the symptomatology of abstinence with barbiturates or meprobamate is distinctly different from abrupt withdrawal of an opiate. Further, physical dependence or addiction with barbiturates and meprobamate has been observed in clinical practice (13-15).

It should be clear that addiction and its relation to narcotics control are complex qualitatively and quantitatively and that our present system of control is not realistically adjusted to this complexity. The Opiates Act says, for example, that the criterion for control

of a new substance shall be ability to produce or sustain an addiction similar to that of morphine or cocaine. If, in this connection, the word similar is interpreted as implying quantitative similarity, difficulty must be encountered in bringing under control a substance of low addiction liability, substantially less than that of codeine, as has been the case with propoxyphene, a weak synthetic analgesic of the methadone group. This particular situation might be clarified by making the criterion for control "qualitatively similar to morphine," leaving to the judgment and experience of the responsible authority whether or not the addiction liability of a particular substance is sufficient in degree to constitute a risk to public health and thus warrants narcotics control. It is possible that control at the manufacturing and wholesale level only would be adequate for substances of low addiction liability where the risk to public health is small, leaving retail trade in drugs of minor addictive potential free of narcotics control, not requiring narcotics prescriptions, narcotics records, and the like.

It has been pointed out that our narcotics laws and regulations, while providing for exempt preparations of codeine and other substances derived from morphine and even for preparations containing up to a certain concentration of morphine itself, make no provision for exempt preparations of synthetic analgesics. Since it is known that the "natural" alkaloids, morphine and substances derived from it, and the synthetic analgesics vary in addictiveness and therefore in risk to public health, both the "natural" and synthetic classes of drugs should be treated in the same way. If exempt preparations are safe and permissible in the "natural" class, they should be safe and permissible in the synthetic class. On the other hand, if the argument is that there is some risk in exempt preparations of morphine and opium because of the possibility of abuse by the consumption of multiple doses, a similar risk would be expected with exempt preparations of synthetic substances with morphine-like addiction liability. The Expert Committee on Addiction-Producing Drugs of the World Health Organization has pointed out repeatedly the risk of

addiction through the use of multiple doses of preparations of strongly addicting substances (16, 17) and that admixture with other substances cannot be relied upon to avoid such risk (18).

In contradistinction to what has just been said about exempt preparations of morphine, of opium, and of synthetics with comparable addiction liability, a very desirable measure of flexibility in narcotics control would be provided by extension of the exempt preparation provisions to substances of low addiction liability, irrespective of origin. Provided such a modification does not contravene any international agreement, the substances in pure form would be subjected to narcotics control, but preparations or combinations of them, in mixtures with other therapeutic non-narcotic agents from which the addicting substance would not be readily recoverable, would be exempt from narcotics control.

Our national laws make no provision for control of a substance not itself addicting but readily convertible into another substance known to be addicting. This lack could lead to grave danger, allowing free trade in the parent substance and giving opportunity for clandestine transformation into the addicting agent. It would seem desirable to control the convertible substance as one would control any substance into which it can be converted.

The categories of control now provided by law or suggested herein for a realistic relationship between degree of narcotics control and risk to public health then should include: full control for substances having high or intermediate addiction liability; the oral prescription list of substances or mixtures having little addiction liability; exempt status for preparations and mixtures of safe concentration from the standpoint of abuse; and control at the manufacturing and wholesale level only for substances with very low addiction liability. In addition, there would be advantage in an official listing of certain compounds to which no narcotics control is presently applied. This listing would include substances related to those under some degree of narcotics control or other substances with clinical usefulness which, because of their general chemical or

pharmacological characteristics, might be considered to have addiction potentiality, but concerning which there is no conclusive evidence of such liability. The listing would make interested parties aware that the status of such compounds would be reviewed from time to time as experience accumulated so that if evidence of addiction or other abuse appeared the proper degree of control would be applied.

To maintain the flexibility of narcotics control and to keep the degree of control applied to all drugs commensurate with the degree of risk to public health, the authority designated by law to make a finding in this field should be empowered to revise such a finding in the direction of either greater or less control, including complete removal of a substance from narcotics control, when experience warrants such revision. The designated authority too should have for its guidance adequately representative technical advice and, before a finding is made, recommendations of that advisory body should be published and an opportunity provided for a hearing and presentation of additional or counter evidence by any interested party, as in the 1946 Opiates Act procedure. Also it is to be understood that any revision of national control with respect to a particular substance must be consistent with our obligations under international agreements.

Addiction Redefined

Two general criteria for narcotics control are available, "addiction-producing and addiction-sustaining similar (or qualitatively similar) to morphine," as in our 1946 Opiates Act; or "liable to the same kind of abuse and productive of the same kind of harmful effects," as in the 1948 protocol. With either would it not be well to substitute for the heterogeneous, albeit comprehensive, definition of addiction of the World Health Organization's expert committee, a definition which would be specifically descriptive of the various qualitative types of addiction already alluded to? The following text is suggested:

For an understanding of the need and scope of narcotics control, drug addiction may be defined as a state of periodic or chronic intoxication produced by the repeated consumption of

a drug (natural or synthetic). Three qualitatively different types may be recognized, the characteristics of which are:

Opiate addiction, of which morphine addiction is the prototype, has three major components: tolerance, physical dependence, and emotional (psychic or psychological) dependence. Tolerance, the need for an increasing dose to produce an effect, is an inevitable accompaniment of opiate addiction but does not develop equally to all effects nor necessarily parallel to physical dependence. Physical dependence is an altered physiological state which requires continued administration of a drug to prevent the appearance of a characteristic illness, termed an abstinence syndrome. Emotional dependence is substitution of the use of the drug for other adaptive behavior, the use of the drug becoming the answer to all of life's problems. The abstinence syndrome is a self-limited illness, beginning with yawning, perspiration, rhinorrhea, and lacrimation, progressing to dilatation of the pupil, waves of gooseflesh, twitching of various muscle groups, hot and cold flashes, and restlessness which may become extreme. There is elevation of systolic blood pressure, respiratory rate, and rectal temperature. Retching, vomiting, and diarrhea ensue in the more severe syndromes. There is complete or almost complete anorexia and rapid loss of weight. The time course varies: it may appear in 2 to 4 hours after the last dose of drug and run its course in not much more than 48 hours; it may be delayed in onset for as much as 48 hours and persist for at least 14 days. The abstinence syndrome is precipitable in whole or in part when physical dependence is present by the administration of an opiate antagonist (nalorphine). Opiate addiction is always associated with a drive or compulsion to continue taking the drug and to obtain it by any means.

Cocaine addiction has as its chief characteristic emotional (psychic or psychological) dependence. Tolerance does not develop, there is no physical dependence, and consequently no abstinence syndrome follows withdrawal of the drug. There may be a drive or compulsion to continue taking the drug, depending upon the degree of psychic dependence. In some areas cocaine abuse is a periodic indulgence progress-

ing to a toxic psychosis, characterized by paranoid delusions.

Marihuana (cannabis), like cocaine, produces emotional (psychic or psychological) dependence only. Physical dependence does not develop and there is no abstinence syndrome. Also little, if any, tolerance develops. Abuse is often sporadic, consisting of a periodic intoxication characterized by elation and distortion of time and space perception.

The amphetamines (benzedrine, *d*-amphetamine) also produce only emotional dependence. There is no physical dependence, no abstinence syndrome, and very little tolerance. Chronic intoxication resulting from abuse resembles in symptomatology chronic intoxication with cocaine.

Barbiturate addiction is characterized by emotional (psychic or psychological) dependence, physical dependence, and partial tolerance, but it implies habitual consumption of amounts far in excess of usual therapeutic doses. While barbiturate addiction has the same three components as opiate addiction, there are two significant differences. First, with the opiates there is evidence to indicate that physical dependence may begin to develop with the first dose; with the barbiturates there is no evidence that significant physical dependence occurs in patients who consume only usual therapeutic doses. Second, the abstinence syndromes with the opiates and with the barbiturates are characteristically different. The barbiturate abstinence syndrome is characterized by anxiety, nervousness, disturbances of cardiovascular responses, twitching of muscle groups, and tremor progressing to convulsions of petit mal or grand mal type and confusion or both, disorientation, and hallucinations predominantly visual. The abstinence syndrome, as with the opiates, is self-limited. Some degree of compulsion to continue taking the drug will occur in barbiturate addiction.

Meprobamate, as well as other hypnotics, may produce an addiction with the same characteristics as the barbiturates.

Non-Opiates and Narcotics Control

The consensus today, nationally and repeatedly affirmed by the Expert Committee on Ad-

diction-Producing Drugs of the World Health Organization, is that, although abuse occurs, narcotics control should not be extended to the amphetamines, the barbiturates, or other sedatives. There are several reasons for this opinion.

Clinical experience leads us to believe that most persons will handle and use these drugs as prescribed and will not develop a chronic intoxication or addiction. This is not believed to be true of the opiates, cocaine, or marihuana. Cocaine and opium are derived from plants whose production is limited to certain areas of the world from which they are transported to processing and consuming countries. International control is absolutely necessary. Amphetamines, barbiturates, and other hypnotics are produced primarily by local manufacturers, making control of imports and exports less of a problem and control of these drugs by local measures effective. Furthermore, indications for the medical use of the amphetamines or of the hypnotics are more numerous and far broader than indications for the opiates, cocaine, or marihuana. The barbiturates are widely used in the treatment of epilepsy, peptic ulcer, hypertension, mild neuroses, and simple insomnia. Meprobamate is finding wide application in mental disease. The amphetamines are used medically as anorexic agents, for the treatment of narcolepsy, to elevate mood in depressed individuals, to elevate blood pressure in shock, and in many other situations.

On the other hand, the main indication for use of opiates is the presence of severe pain; the use of cocaine is practically limited to local anesthesia; and marihuana has no medical indication. To place the restrictive regulations of narcotic laws on the amphetamines, the barbiturates, and other sedatives would hamper proper medical use and would not be justified in view of the relatively low public health risk which is already mitigated through regulations in respect to these drugs in the food and drug statutes, both Federal and State.

Conclusions

It is concluded that implementation of suggestions made in the discussion with respect to changes in our national narcotics control regimen would:

1. Remove any distinction between substances of natural or purely synthetic origin with respect to the possibility of exempt preparations.

2. Provide flexibility of narcotics control based upon the degree of risk involved, varying from full control for substances of high addiction liability to control at the manufacturing and wholesale level only for substances of low addiction liability. Alternatively for the latter group, control of the pure substance and exemption from control of its preparations with other therapeutic agents might be provided.

3. Bring local regulations into line with the international narcotics conventions.

4. Encourage the development of much needed analgesics of an efficacy more or less comparable to codeine which might have low addiction liability by making possible a commensurate degree of narcotics control.

5. Clarify the meaning of addiction in relation to narcotics control, by descriptive definition and by basing the application of control to new substances upon properties qualitatively similar to those of morphine.

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Training in Epidemiology

A course in applied epidemiology will be offered at the Rocky Mountain Field Training Station of the Communicable Disease Center, Public Health Service, in Denver, Colo., November 16-20, 1959.

Designed primarily for physicians who investigate disease outbreaks or who have administrative responsibility for such investigations, this course serves as a review for experienced health administrators and as a guide to physicians new to public health.

Emphasis is placed on developing an understanding of the use of epidemiological techniques to solve problems pertaining to preventable diseases. Lecture-discussion sessions and audiovisual aids are used in the presentations. Group participation is stressed through group solution of epidemiological problems, seminars, and panel discussions. Registrants will be expected to attend all sessions of the course.

Further information and application forms may be obtained from: Chief, Communicable Disease Center, Public Health Service, 50 Seventh Street NE., Atlanta 23, Ga., Attention: Chief, Training Branch; or from: Public Health Service, Region VIII, First National Bank Building, Denver 2, Colo.

A substantial number of hospitalized cases of cystic fibrosis with a relatively high fatality rate indicates one aspect of the health problem presented by this disease, first differentiated only some 20 years ago.

A National Hospital Survey of Cystic Fibrosis

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and ELIZABETH R. KRAMM, Ph.D.

CYSTIC FIBROSIS, also known as fibrocystic disease of the pancreas and as mucoviscidosis, has been increasingly recognized during recent years as one of the major diseases of childhood. As recently as 1938, Andersen (1) differentiated the disease from other superficially similar conditions. It is known to be a familial disease involving malfunction of various exocrine glands, but the basic defect underlying its pathological manifestations is not yet understood.

Clinically, cystic fibrosis is most often evidenced by chronic digestive and respiratory disturbances appearing usually in infancy or early childhood. Without treatment these generally progress to nutritional failure or severe respiratory involvement, or both, and to death before school age. Other manifestations include intestinal obstruction in the newborn, heat prostration, and, more rarely, cirrhosis of the liver. Cure is not possible, but with the use of recently

developed methods of diagnosis and treatment prognosis has become more hopeful. When the disease is recognized in its early stages or in milder forms, development of serious symptoms can often be prevented. Antibiotics help to control the susceptibility to respiratory infection, but once pulmonary lesions are established they tend to persist and can be fatal or seriously handicapping.

The frequency of the disease in the general population is not known, but it appears to be high. On the basis of a small survey of hospitals and pediatricians, it was estimated that during the period 1945-49 the disease occurred 7 to 10 times per 10,000 live births (2). The condition has been found in about 3 percent of the autopsies performed in children's hospitals (3). Early clinical experience with the disease indicated that death occurs in infancy or early childhood for a majority of positively diagnosed cases (4). Recently, however, survival beyond childhood of patients with cystic fibrosis has been noted with increasing frequency (5).

The Children's Bureau and the National Office of Vital Statistics are cooperating in a project designed to obtain information on the magnitude and characteristics of the health problem presented by cystic fibrosis. In the first phase of the study, reported here, data have been obtained by a mail survey on the number of children with a diagnosis of cystic fibrosis who were cared for in hospitals during

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the period 1952 through 1958. The next phase will be concerned primarily with the development and testing of methods for conducting a national epidemiological study of the disease.

The hospital survey was undertaken first not only because the need for hospital care is an important aspect of the health problem presented by this disease, but also because information about hospitalized patients is more readily available than any other data on prevalence since most hospitals maintain an index of diseases which makes possible the identification of cystic fibrosis patients. It is generally believed, however, that the number of hospitalized patients is only a fraction of the total number of children with the disease.

Method

The survey covered all hospitals in the continental United States listed in the American Hospital Association and the American Osteopathic Hospital Association directories for 1958, except psychiatric institutions. A stratified sample of about 9 percent, or 616, of the 6,723 listed nonpsychiatric hospitals was selected. All 296 hospitals approved for pediatric residency were taken. A sample of other hospitals was selected with probability roughly proportionate to the number of hospital beds. The sampling rates ranged between 2 and 100 percent for the hospitals with the smallest and largest numbers of beds, respectively (table 1).

Questionnaires were sent by regular mail to the sample hospitals. Hospitals that did not return them within 2 weeks were sent a follow-up letter by certified mail. Toward the end of the fourth week of the survey, telephone calls were made to the larger hospitals with pediatric residencies that had not responded. Returned questionnaires were edited for completeness and consistency, and special letters were sent to hospitals that reported incomplete or inconsistent information. The survey lasted 5 weeks, from January 8 through February 13, 1959.

Interpretation of Data

The questionnaire requested information on the number of different patients discharged with a diagnosis of cystic fibrosis, the number of dis-

charges for these patients, and the number of discharges that were due to death. Separate information was requested for each calendar year during the 7-year period 1952-58. Because cystic fibrosis (indexed under fibrocystic disease of the pancreas) was listed for the first time in the fourth edition of the American Medical Association's Standard Nomenclature of Diseases and Operations, published in 1952 (6), that year was chosen as the beginning of the study period. The standard nomenclature is the basis for disease indexing in the vast majority of hospitals in the United States. Additional information relating to the characteristics of the discharges for 1957 was also requested, but these data are not considered in this report. The final section of the form requested information about the type and currency of diagnostic indexing, which was useful in evaluating the quality of the reported data.

Evaluation of the quality of the data reported by the hospitals for the 6-year period 1952-57, shown in table 2, was based entirely on the completeness and consistency of the data on the returned form. Data for 1958 were excluded because a substantial number of hospitals had not yet completed their diagnostic indexing for that year. According to the evaluation criteria, about 80 percent of the hospitals reported complete and consistent information for the entire 6-year period. By the cutoff date no data were reported for almost 10 percent of the hospitals:

Table 1. Sampling strata of the national hospital survey of cystic fibrosis

Type and size of hospital	Sampling rate (percent)	Number of listed hospitals	Sample size
All hospitals in AHA and AOHA directories (psychiatric institutions excluded).....	9.16	6,723	616
Hospitals with pediatric residencies.....	100.00	296	296
Other hospitals.....	4.98	6,427	320
1,000 or more beds.....	100.00	37	37
300-999 beds.....	20.00	425	85
200-299 beds.....	10.00	508	51
100-199 beds.....	5.00	1,197	61
Less than 100 beds.....	2.00	4,260	86

Table 2. Evaluation of hospital reporting in national survey of cystic fibrosis for period 1952-57, by type and size of hospital

Type and size of hospital	Sample size	Percent of sample				
		Complete and consistent data for full period	Complete and consistent data for part of period	No data		
				Total	Non-response	Other reasons
All hospitals in AHA and AOHA directories (psychiatric institutions excluded).....	616	79.5	11.0	9.4	7.0	2.4
Hospitals with pediatric residencies.....	296	79.1	10.8	10.1	7.1	3.0
Other hospitals.....	320	80.0	11.3	8.8	6.9	1.9
1,000 or more beds.....	37	83.8	10.8	5.4	2.7	2.7
300-999 beds.....	85	84.7	8.2	7.1	5.9	1.2
200-299 beds.....	51	66.7	19.6	13.7	9.8	3.9
100-199 beds.....	61	88.5	8.2	3.3	3.3	0
Less than 100 beds.....	86	75.6	11.6	12.8	10.5	2.3

7 percent did not respond and 2.4 percent indicated inability to comply with the request for data within the specified time. (About one-fourth of the nonresponding hospitals replied within 1 month after the cutoff date but too late to be included in this analysis.) Another 11 percent of the hospitals returned forms which were evaluated as incomplete or inconsistent for 1 or more years between 1952 and 1957.

One exception was made in evaluating the returned forms. A large pediatric residency hospital provided annual data for the number of patients discharged and the number of deaths but could not provide information on the total number of discharges within the time limits. Discharges were estimated by assuming

a ratio between discharges and patients based on data reported by another large pediatric residency hospital.

As might have been expected, the reported hospital data were more complete and consistent for the more recent years. About 89 percent of the hospitals reported complete and consistent information for 1957 as compared with 82 percent for 1952 (table 3).

Tabulations of reported frequencies of patients, discharges, and deaths during 1957 were based solely on hospitals providing complete and consistent information for that year. The tabulated frequencies were appropriately adjusted for the hospitals excluded from the tabulations under the assumption that their expe-

Table 3. Percentage of hospitals reporting complete and consistent data on patients, deaths, and discharges with a diagnosis of cystic fibrosis, by type and size of hospital, 1952-57

Type and size of hospital	Sample size	1957	1956	1955	1954	1953	1952
All hospitals in the AHA and AOHA directories (psychiatric institutions excluded).....	616	89	88	87	85	84	82
Hospitals with pediatric residencies.....	296	88	86	87	85	84	82
Other hospitals.....	320	90	89	88	85	83	82
1,000 or more beds.....	37	97	97	95	95	89	87
300-999 beds.....	85	91	91	89	87	86	85
200-299 beds.....	51	84	84	82	77	75	71
100-199 beds.....	61	93	95	95	92	92	92
Less than 100 beds.....	86	86	81	80	79	78	77

Table 4. Estimated number of patients, discharges, and deaths with a diagnosis of cystic fibrosis reported by hospitals, United States, 1957

Type of hospital	Patients	Discharges	Deaths
All hospitals-----	2, 525	3, 229	359
Hospitals approved for pediatric residency---	1, 186	1, 544	237
Other hospitals-----	1, 339	1, 685	122

rience was the same as that reported by hospitals included. The adjusted frequencies were subsequently inflated by the inverse of the sampling rate to obtain the national estimates presented in this report. The adjustment and inflation of the tabulated frequencies were made independently for each sampling stratum. Data for two hospitals which specialized in research on cystic fibrosis and which reported the highest caseloads were excluded prior to adjusting the estimates for nonreporting hospitals approved for pediatric residency. The trend figures for 1952-57 were based on hospitals providing complete and consistent information for the 6-year period, and the frequencies were adjusted and inflated as for the 1957 data.

A qualifying statement is necessary regarding the estimates of the number of cystic fibrosis patients presented in this report. The hospitals were requested to report the number of different patients who were discharged each year. No attempt was made, however, to obtain identifying data on individual cases such as would be needed to eliminate duplicate re-

porting of cases from year to year within the same hospitals or from different hospitals within the same year.

Since the survey was conducted with a sample of hospitals, the estimates presented in this report are subject to sampling errors. The approximate sampling errors in the estimates of patients, discharges, and deaths for 1957 are shown below. The chances are about 19 out of 20 that differences due to sampling variability between the estimate based on the sample of hospitals and the figure that would have been obtained from a survey of all hospitals is less than twice the sampling error. The sampling errors of the estimates for other years were roughly the same as those for 1957.

Type of hospital	Percent sampling error		
	Patients	Discharges	Deaths
All hospitals-----	10	10	10
Hospitals not approved for pediatric residency-----	20	20	30

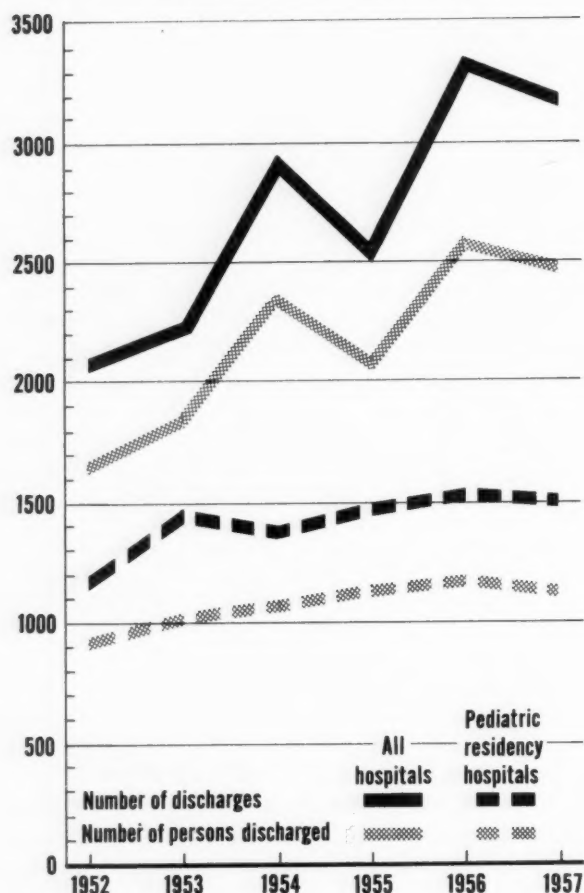
Estimates for 1957

About 2,500 patients with a diagnosis of cystic fibrosis were discharged from hospitals in the United States during 1957 (table 4). This estimate is probably somewhat higher than the true figure because patients discharged with this diagnosis from more than one hospital during 1957 were counted by each hospital. Approximately 95 percent of the 2,500 patients were under 20 years of age. For these 2,500 patients, about 3,200 discharges were reported, indicating multiple discharges from the same hospital during 1957 for many of them. About 360 hospital deaths were attributed to cystic fibrosis, or ap-

Table 5. Trend in the estimated number of patients, discharges, and deaths with a diagnosis of cystic fibrosis, by type of hospital, United States, 1952-57

Year	All hospitals			Pediatric residency hospitals		
	Patients	Discharges	Deaths	Patients	Discharges	Deaths
1957-----	2, 525	3, 229	359	1, 186	1, 544	237
1956-----	2, 611	3, 375	451	1, 210	1, 586	237
1955-----	2, 112	2, 638	475	1, 170	1, 490	248
1954-----	2, 379	2, 981	387	1, 127	1, 425	205
1953-----	1, 900	2, 309	371	1, 101	1, 487	234
1952-----	1, 687	2, 107	295	981	1, 259	198

Figure 1. Trend in the number of patients and discharges with a diagnosis of cystic fibrosis from hospitals, United States, 1952-57



proximately 1 out of every 7 patients with the diagnosis.

Although hospitals with pediatric residencies represented less than 5 percent of all hospitals, they accounted for almost 50 percent of the patients and discharges and almost 65 percent of the deaths (table 4). The two children's hospitals, Babies Hospital in New York City and Children's Medical Center in Boston, in which physicians have for a long time had special interest in this disease, accounted for about 6 percent of the patients and discharges and 7 percent of the deaths reported for 1957.

Trends for 1952-57

The annual number of patients with cystic fibrosis increased by about 50 percent during the 6-year period 1952-57, or from about 1,700

to about 2,500 (table 5, fig. 1). During the same period the population under 20 years of age, which included virtually all the diagnosed cases of cystic fibrosis, increased only between 15 and 20 percent. Most of the increase in cystic fibrosis patients occurred in hospitals not approved for pediatric residency, the number in pediatric residency hospitals remaining relatively constant during the entire period.

The number of discharges also increased by about 50 percent, or from 2,100 in 1952 to about 3,200 in 1957, and again most of the increase occurred in nonpediatric hospitals (table 5, fig. 1).

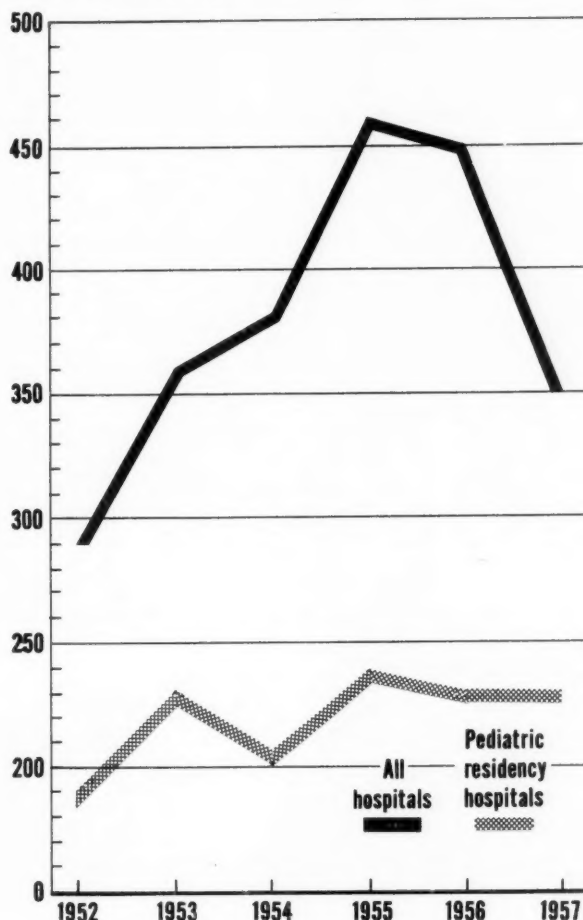
The number of hospital deaths attributed to cystic fibrosis reached a peak during 1955 and then declined in 1957 (table 5, fig. 2). During the 6-year period, the proportion of deaths ranged between 14 and 25 percent of the total number of patients discharged with the disease. It is difficult, however, to draw conclusions about the death trend from these data since most of the annual changes in the number of deaths in hospitals may reflect sampling variability.

Discussion

This survey has provided data on the number of patients with a diagnosis of cystic fibrosis discharged from hospitals in the United States for each of the 6 years from 1952 through 1957. However, the numbers for individual years cannot be added together to obtain a total for the period since the same persons could have been reported for 2 or more years. Even within a single year there could have been duplicate reporting for patients discharged from more than one hospital during that year.

In the years covered by the survey there has been a continuous and substantial increase in the annual number of patients hospitalized with a diagnosis of cystic fibrosis. Since this increase is about three times greater than the increase in the size of the population under 20 years of age, it is only partially explained by this factor. The increase may be interpreted as indicating greater success in recognizing the disease. Most of the increase is reported from hospitals that do not have a pediatric residency and is probably the result of an increased awareness of the disease outside pediatric

Figure 2. Trend in the number of deaths attributed to cystic fibrosis in hospitals, United States, 1952-57



centers. Greater awareness on the part of physicians and improved diagnostic techniques have resulted in earlier recognition of the milder forms of the disease, many of which do not require hospitalization. The cystic fibrosis patients hospitalized in 1957, therefore, probably represented a smaller proportion of the total number of cases known to physicians than did the patients hospitalized in 1952, even though the number of persons hospitalized for the disease had increased 50 percent from 1952 to 1957.

Data are yet to be obtained on the ratio of persons hospitalized with cystic fibrosis to total persons with the disease. There are diagnosed cases which have not been admitted to a hospital as well as undiagnosed cases. Concerning the former, Dr. Harry Shwachman of the Children's Medical Center in Boston, a center long

known for its interest in cystic fibrosis, has estimated that of the 500 children with this condition followed in his office or clinic practice, at least 25 percent have never been hospitalized. Dr. Gordon E. Gibbs in the department of pediatrics of the University of Nebraska has stated that of 40 children with cystic fibrosis directly or indirectly under his care only 4 have ever been admitted to a hospital. It seems likely that the 2,500 cystic fibrosis patients discharged from hospitals in the year 1957 represent only a small part of the total number of patients with the disease, although the exact proportion is still uncertain.

That the number of hospital discharges with a diagnosis of cystic fibrosis is nearly a third greater than the number of persons so discharged in the same year indicates that many of the patients are so ill as to need repeated hospital admissions within a short period. On the basis of an estimated 2,800,000 hospital discharges for patients under 15 years of age from July 1957 through June 1958 (7), cystic fibrosis was the diagnosis of roughly 1 in every 1,000 hospital discharges among children.

The estimate of the number of annual hospital deaths attributed to cystic fibrosis obtained from this survey is supported by information from another source. The National Office of Vital Statistics has obtained an estimate of the number of deaths attributed to cystic fibrosis by coding the disease separately in its analysis of a 10 percent sample of 1958 death certificates. Such data have not been obtained nationally in previous analyses of death certificates because cystic fibrosis has hitherto been included in the residual category "Other diseases of pancreas."

Analysis of the sample of 1958 death certificates revealed an estimated 560 deaths in the United States attributed to cystic fibrosis in that year. Of these, about 400 occurred in hospitals. With due regard to sampling error, this is consistent with the finding from the hospital survey of an estimated 359 hospital deaths attributed to cystic fibrosis in 1957. The finding that about 160 (over one-fourth) of the cystic fibrosis deaths reported on 1958 death certificates occurred outside hospitals is evidence that the children are not always hospitalized even during the most acute phases of the illness.

Estimates of 1958 deaths by cause for the population under 15 years indicate that cystic fibrosis ranked higher as a cause of death than such other diseases as diabetes, rheumatic fever, and poliomyelitis. Cystic fibrosis is comparable to these diseases not only as a cause of death but also in the lasting and handicapping disability it often causes in patients who survive.

Summary

A nationwide hospital sample survey, conducted between January 8 and February 13, 1959, obtained information about hospital patients discharged with cystic fibrosis. The survey provided the following national estimates:

1. In 1957, about 2,500 patients were discharged from hospitals with a diagnosis of cystic fibrosis. Of these, 95 percent were under 20 years of age. The total number of discharges for that year was approximately 3,200, indicating repeated hospitalization for many of the patients. About 360, or 14 percent of the patients, were discharged by death. (A sample of 1958 death certificates indicated that roughly one-fourth of all deaths due to cystic fibrosis occur outside hospitals.)

2. From 1952 to 1957, the number of hospitalized patients with the disease increased by approximately 50 percent. There was a corresponding increase in the total number of discharges. Most of the increase in the number of patients and discharges occurred in hospitals other than those approved for pediatric residency. The estimated number of deaths in 1957 was approximately 20 percent greater than the estimate for 1952, but this difference

may be attributed to sampling error. During the intervening years, a somewhat higher number of deaths was reported.

Although estimates of the number of patients discharged from hospitals with a diagnosis of cystic fibrosis are probably far short of the prevalence of the disease in the general population, the fact that in 1 year 2,500 persons were hospitalized and that 1 out of every 6 or 7 was discharged by death affords a striking picture of the seriousness of this disease.

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A pilot program in Bolivia demonstrates the feasibility of smallpox eradication by mass vaccination at the sources of the disease.

Smallpox Eradication

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NATIONS freed of smallpox are confronted by a continuous threat of reinvasion from the endemic foci remaining in the world. The concept of control, limited to the protection of a national population and resigned to the existence of endemic foci in other nations, requires a perpetual and elaborate system of defense: education, general vaccination in infancy, routine revaccination, reporting, isolation, disinfection, quarantine, investigation, contact vaccination, general revaccination, international notification, certification, and medical inspection. However, the frequent movement of the disease across international boundaries shows that, even with elaborate control measures, no nation can permanently prevent reinfection.

Dr. Frederiksen, who is now program officer, Division of International Health, Public Health Service, served in 1957 and 1958 as director of the Servicio Cooperativo Interamericano de Salud Pública, a joint agency of the Republic of Bolivia and the United States. Dr. Torres Muñoz was associate director of the agency, and Dr. Jauregui Molina, director of SCISP's vaccination service.

Only the eradication of smallpox would end the threat of the disease, as well as the otherwise unending efforts and costs of control. What are the prospects for eradication once all nations join in an unrelenting attack on smallpox wherever transmission persists?

Rather than evaluate hypothetical obstacles to eradication it seems appropriate to cite the circumstances, methods, and results of the pilot program in Bolivia undertaken by the Servicio Cooperativo Interamericano de Salud Pública. With one of the highest attack rates for smallpox, Bolivia was one of the principal endemic foci in the American Hemisphere (1). Because of a unique combination of adverse factors, Bolivia was a testing ground for the feasibility of smallpox eradication through the progressive elimination of the endemic foci remaining in the world.

The Setting

Landlocked in the heart of the South American continent, Bolivia has climate and scenery that range from steaming tropical to Alpine. Most of its 1 million square kilometers is tropi-

cal lowland along the cayman-infested headwaters of the Amazon. The majority of the 3.3 million people of Bolivia live on the highland plateau, the Altiplano, at an elevation of 3,500 meters, where La Paz, the seat of government, is located.

Bolivia is thinly populated, with a density of 3.3 persons per square kilometer. Means of communication are limited. Much of the country is inaccessible by road, and most of the existing roads are unsurfaced and frequently are blocked by floods and landslides. Bolivia is one of the few countries of the world with areas still awaiting exploration.

While ethnic distinctions are blurred, the population can be divided sociologically into a literate minority, largely of Spanish descent, and an illiterate majority of Indian stock. The Indians usually have only a little knowledge of the official language, Spanish.

A number of devastating wars and revolutions have impeded development. The country, while potentially rich, remains undeveloped, and the per capita income is low. The combination of adverse factors has limited health services to a minority.

Past Control Efforts

Data indicated that vaccinations in Bolivia were deficient in quantity and quality. In

115 samples totaling 47,742 persons from the highland plateau, the valleys, and lowlands, the proportion of those previously vaccinated fluctuated between 11.1 percent and 94 percent, with a median of 69.3 percent. While this percentage may seem fairly satisfactory, a closer examination reveals a less reassuring situation. In Sucre, the legal capital, which had one of the highest percentages of previous vaccinations, 93.1 percent, only 32.5 percent were found to be vaccinated in the 0-4 age group. In other provinces fewer persons have been vaccinated during infancy and childhood.

The lack of vaccination during infancy and childhood is reflected by the high proportion of the smallpox deaths which are reported in the 0-4 age group. In a recent sample, 95 of 136 consecutive deaths reported were in this age group.

The low percentage of vaccinations, particularly during early childhood, is complicated by the poor quality of vaccinations in the past, largely attributable to the use of glycerinated vaccine without adequate refrigeration facilities. A potent glycerinated vaccine has been successfully produced and applied in Sucre, but this vaccine has not produced reliable results in other parts of the country, as a result of difficulties in maintaining the potency of the glycerinated vaccine. A sample of 463 individuals from a highland province with a temperate

Table 1. Prevalence of pockmarked persons in Bolivia by age group and department, 1958

Department	Age group (years)														
	0-4			5-9			10-19			20-39			40 and over		
	Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked		Number in sample	Pock-marked	
		Number	Percent		Number	Percent		Number	Percent		Number	Percent		Number	Percent
La Paz-----	1, 526	13	0. 9	3, 279	120	3. 7	4, 390	292	6. 7	2, 600	687	26. 4	1, 500	613	40. 9
Oruro-----	598	1	. 2	834	9	1. 1	798	25	3. 1	792	117	14. 8	258	58	22. 5
Potosí-----	907	14	1. 5	2, 031	41	2. 0	1, 579	77	4. 2	1, 086	182	16. 8	544	171	31. 4
Cochabamba-----	2, 959	60	2. 0	3, 193	102	3. 2	3, 134	212	6. 8	3, 070	406	13. 2	2, 048	478	23. 3
Chuquisaca-----	759	0	0	1, 682	2	. 1	1, 427	19	1. 3	1, 144	97	8. 5	846	173	20. 4
Tarija-----	128	0	0	156	0	0	229	0	0	184	2	1. 1	146	14	9. 6
Beni-----	36	0	0	48	1	2. 1	39	1	2. 6	48	3	6. 3	25	3	12. 0
Santa Cruz-----	1, 372	2	. 1	1, 295	18	1. 4	1, 612	39	2. 4	1, 488	110	7. 4	828	76	9. 2

Table 2. Correlation between population density and the prevalence of pockmarked persons by age groups in five provinces of the highland plateau of Bolivia, 1958

Province	Popu- lation density per square kilo- meter	Age group (years)															
		0-4				5-9			10-19			20-29			40 and over		
		Num- ber in sam- ple	Pock- marked		Num- ber in sam- ple	Pock- marked		Num- ber in sam- ple	Pock- marked		Num- ber in sam- ple	Pock- marked		Num- ber in sam- ple	Pock- marked		
			Num- ber	Per- cent		Num- ber	Per- cent		Num- ber	Per- cent		Num- ber	Per- cent		Num- ber	Per- cent	Num- ber
Manco																	
Kapac	60.3	20	1	5	47	4	8.5	46	10	21.7	36	18	50	30	23	76.6	
Camacho	32.5	252	4	1.6	282	30	10.6	344	81	23.5	449	206	45.9	310	173	55.8	
Omasuyos	31.4	171	1	0.6	245	17	6.9	196	33	16.8	218	81	37.1	167	82	49.1	
Los Andes	30.9	231	1	0.4	300	8	2.6	408	21	5.1	363	89	24.5	223	103	46.1	
Ingavi	12.2	222	0	0	254	7	2.7	401	24	5.9	360	101	28	147	57	38.7	

climate revealed that only 37.6 percent of those vaccinated within the past 10 years were immune, and of those vaccinated 10-40 years previously, only 3 percent were immune. The low percentages cannot solely be attributed to a loss of immunity and lack of revaccination.

The prevalence of pockmarked persons by age groups and department gives an indication of the previous incidence of smallpox (table 1). It might be recalled that for every three pocked individuals there has been one death from smallpox with the assumption of a fatality rate of 25 percent.

The highest prevalence of pockmarked persons is in the La Paz Department, particularly among those over 40 years of age with 40.9 percent pockmarked. The greatest prevalence of pockmarked individuals in this department may be attributed to the cool dry climate and the relative density of the population and the means of communication, as compared with the remainder of Bolivia.

The correlation of smallpox with cool dry climate is supported by the seasonal peak observed in Bolivia during the dry winter months.

The percentages of pockmarked persons in five provinces of the La Paz Department along the shores of Lake Titicaca, quite identical in respect to topographic, climatic, socioeconomic, and racial factors, confirm the correlation between population density and the prevalence of pockmarked individuals (table 2).

It is interesting to note that immunity fol-

lowing smallpox, at least to vaccination, is not absolute. In a sample of 434 pockmarked persons over 10 years of age, only 56.5 percent displayed immune reactions. Nevertheless, a second attack in the same individual seems to be a rare occurrence, which is attributed to the longer duration of immunity to smallpox than to vaccination.

The assessment of the consequences of the disease must also include blindness. In Bolivia smallpox ranks as the principal cause of blindness, with more than one-third of the inmates of institutions for the blind dating their history of disability from an attack of smallpox.

The Campaign

Cochabamba, the central department of Bolivia, was the epicenter of an epidemic wave with 87 outbreaks of smallpox reported during 1957. Emergency efforts were undertaken during the latter half of that year. Simultaneously, preparations were made for a nationwide campaign. The preparations included a successful request for a budget of \$125,000 and supporting legislation, importation of equipment and vaccine, development of methods, preparation of a plan of operations, and selection and training of personnel. The emergency efforts to combat the epidemic in Cochabamba, undertaken with personnel and equipment borrowed from other programs, provided a test for the methods and plan of operations.

Methods first developed and successfully applied in Iran were refined and reapplied in Bolivia (2). The campaign was conducted by the Servicio Cooperativo Interamericano de Salud Pública under the auspices of the Ministry of Public Health of Bolivia and the International Cooperation Administration of the United States.

We hoped that approximately 2.5 million of the estimated 3.3 million people of Bolivia in areas with incidence of smallpox or with relative density of population would be vaccinated during the attack phase of the campaign in 1958.

Personnel and Equipment

During the attack phase the smallpox vaccination service of the Servicio, full strength, consisted of 11 teams of vaccinators and supervisory and supportive personnel, a total of 83 persons. Each team of four vaccinators was headed by a team leader who was responsible for quantity and quality of the vaccinations, discipline of the vaccinators, and maintenance of equipment. A physician and two inspectors were assigned to direct and inspect the operations of each of the five teams. A director of the service, an administrative assistant, 17 drivers, and 3 boatmen completed the organization. In addition, the vaccination service had the full support of the administration, health education, and statistics divisions of SCISP, as well as substantial support from other agencies and the public.

Each vaccinator carried a portable vaccination kit which contained all necessary materials for vaccination house to house. The kit included disposable sterile pins, lyophilized vaccine, diluent (50 percent glycerine), and an indelible dye (10 percent silver nitrate).

The motorized teams, inspectors, and physicians were provided with four-wheel drive vehicles equipped with winches and loudspeakers. Three launches powered by 12-hp. outboard motors transported a fluvial team.

The teams were also supplied with portable battery-operated loudspeakers. The staff received two sets of uniforms and boots. Adequate campaign equipment and supplementary rations were issued.

Vaccination Techniques

Only lyophilized vaccine was used in the campaign. The vaccine was supplied by the Institut de Vaccine, Paris, and the Instituto Nacional de Salud Pública, Lima. At no time was the vaccine refrigerated. Some of the vaccine had been stored for as long as 1 year prior to use. Routinely, the potency of the vaccine was retested prior to issuance. The minimal standard for potency required confluency at 1:1,000 dilution with the method of Force and Leak; all lots from Lima and Paris produced confluency at greater dilutions.

The vaccine was reconstituted with a 50 percent solution of glycerine and distilled water by the team leader in the field. Any reconstituted vaccine remaining unused at the end of the day was discarded.

The vaccination procedure was simplified by eliminating the prior application of alcohol or other virucide and by using a sterile, disposable pin for each inoculation. A drop of vaccine was placed over the insertion of the deltoid of the left arm and a single scratch of about 5 mm. in length was made through the drop without drawing blood.

Using the single scratch, which provides visible evidence of vaccination, facilitated uniformity of technique. Consequently, standards could be maintained. The little finger of the vaccinee's left hand was dipped in indelible ink to expedite subsequent inspection of the quantity and quality of the vaccinations. No vaccination certificates were issued, and the vaccinators kept no records other than noting in an itinerary the number of vaccinations and the lot number of the vaccine.

Inspection

The inspectors followed the vaccinators, reading the takes on the ninth day and checking the work of a different vaccinator each day. With 1 inspector for every 8 to 12 vaccinators, the work of every man was reviewed at least once every 2 weeks. The samples inspected consisted of a sufficient number of households to obtain, whenever possible, a total of at least 100 individuals in each locality or subdivision covered by a vaccinator during 1 day. The inspectors recorded the name, age, evidence of previous smallpox, and previous and current

vaccination with type of take of each person in the samples.

The data of the vaccinators and inspectors were routinely tabulated to provide a variety of information including the number vaccinated by month, province, and vaccinator; average number vaccinated per man-day; percentage vaccinated in the campaign; percentage pockmarked by age group and province; percentage with prior vaccination; and percentage of primary takes by vaccinator and lot of vaccine. In addition, tables and maps were maintained for the cases and deaths reported.

Public Information

In the rural areas advance notification of the day of vaccination was given, and at that time the cooperation of the community leaders was obtained. Prior to and during the vaccinations loudspeakers were employed to arouse and inform the public. Possibly of greatest importance was the personal contact of the vaccinator with the individual at the time of vaccination. Everyone vaccinated was considered a potential health educator who could inform family, friends, and neighbors of the harmless but important procedure.

Additional means of informing the public in urban areas included newspapers, radio, pamphlets, and posters. In epidemic situations in two of the largest cities the public cooperated with a more or less spontaneous boycott of those not vaccinated. When the majority of the population had been vaccinated, permission was obtained from the officials of certain public facilities to announce that no one unvaccinated would receive service, effective the following week. Immediately, bus drivers, elevator operators, and most everyone who had taken the trouble to get vaccinated spontaneously supported the boycott. Instead of creating bad feelings, it led to a new form of salute, the raised little finger. The epidemics were abruptly terminated.

Operations

The operations of the vaccination campaign were outlined in specific itineraries for the vaccinators covering periods of about 25 days, including Sundays and holidays, and followed by commensurate days of compensatory leave

when preparations were made for the next itinerary. The vaccinators received individual assignments of specific areas to facilitate the evaluation of the quantity and quality of work. To maintain discipline and aid morale, whenever possible the teams of four vaccinators were given assignments sufficiently close together to permit them to share eating facilities and billeting.

Vaccinations were performed house to house and, when appropriate, were followed by a vaccination session at a temporary center for those who had been missed in the house-to-house vaccinations. Everyone was vaccinated, regardless of age, sex, or previous history of vaccination and smallpox. Those less than 4 weeks old, the acutely ill, and those with eczema were the only exceptions.

The teams proceeded along the main or secondary roads and the rivers and their branches, reaching on foot population concentrations up to 20 kilometers distant from road or river. In instances of reported outbreaks, the teams rented mules and traveled up to 100 kilometers distance from the roads.

Evaluation and Results

With the vaccination of 2,432,186 persons, about three-fourths of the estimated population of Bolivia, the attack phase of the campaign was completed on schedule by the end of 1958.

In the target areas samples totaling 42,075, widely distributed in time and place, showed 91 percent of the population had been vaccinated. The high percentage vaccinated is attributed to the house-to-house visits, followed by a vaccination session at a temporary center, and the use of loudspeakers to attract the people.

The inspection of primary vaccinations of 3,662 infants in samples, widely distributed in time and place, yielded 96.3 percent primary takes.

An average of 210 vaccinations were performed per man-day, excluding the performance in major cities from the calculation. This high average is attributed to advance planning of itineraries, simplicity of the vaccination technique, and paucity of recording required of the vaccinator, permitting exclusive

dedication to vaccination. The indelible dye not only saved time but provided a more reliable record for inspection purposes than histories or vaccination certificates.

As a result of the high average of vaccinations per man-day, the costs of the campaign, including personnel, vehicle, equipment, vaccine, and all other expenses, were held to 5 cents per vaccination.

The dramatic reduction in reports of smallpox best illustrates the results of the attack phase. In 1957 Bolivia suffered the highest attack rate for smallpox in the Americas. By the end of 1958 Bolivia enjoyed one of the highest levels of immunity and experienced an apparent cessation of transmission (table 3). Since November 1958, no smallpox has been reported in the Weekly Epidemiological Reports of the Pan American Sanitary Bureau.

The efficiency of the methods and the efficacy of the lyophilized vaccine are confirmed.

Consolidation and Followup

During the consolidation phase, to be completed by four mobile teams in 1959, vaccinations will be extended to those in sparsely populated and rather inaccessible areas not reached during the attack phase.

With the completion of this phase the Servicio will have discharged the mandate of the bilateral project agreement. Unless the agreement is amended and extended, maintenance of vigilance and a high level of immunity will be a function of the Ministry of Public Health.

Now that smallpox is no longer endemic in Bolivia the occurrence of a single case must be considered as an emergency and treated accordingly. The prevention of rapid recurrence of widespread infection will require the

maintenance of a complete and efficient system of defense including a network of centers and mobile teams for vaccination and revaccination, early recognition of any residual focus and imported cases, reporting, laboratory confirmation, casefinding, and contact and ring vaccination in remote rural as well as urban areas. Arrangements for the continued importation or the national production and testing of lyophilized vaccine will also be necessary.

The high level of vigilance and immunity will have to be maintained even after the completion of campaigns in other South American nations removes the source of this disease from the American Hemisphere until global eradication is achieved.

Global Eradication

Abrupt elimination of one of the principal foci in the American Hemisphere by a mass campaign in the face of a unique combination of factors adverse to control through routine services illustrates the feasibility of smallpox eradication by a systematic attack on the sources of the disease.

The campaign in Bolivia, assisted by the International Cooperation Administration, formed an integral part of a hemispheric campaign. In 1950 the governing bodies of the Pan American Sanitary Organization recommended that the member governments undertake systematic programs of smallpox vaccination and revaccination in their respective territories with the aim of eliminating the disease from all parts of the Western Hemisphere. The Pan American Sanitary Bureau drew up a program designed to stimulate the efforts of the Americas (3).

Table 3. Cases of smallpox reported by the Ministry of Public Health, Bolivia, to the Pan American Sanitary Bureau, by 4-week periods, 1955-59

Year	Total	4-week periods												
		1st	2d	3d	4th	5th	6th	7th	8th	9th	10th	11th	12th	13th
1955	356	15	7	58	38	35	16	36	8	16	30	42	17	38
1956	417	29	11	7	22	38	28	41	77	38	23	43	49	11
1957	1,310	36	31	38	56	94	276	189	141	148	106	121	53	21
1958	183	14	16	11	4	13	11	27	45	32	8	1	1	0
1959		0	0	0	0	0	0	0						

Smallpox has been eliminated from North and Central America. In 1958 smallpox eradication programs, assisted by the Pan American Sanitary Bureau, were being undertaken in eight American countries. Intensification of efforts in three countries with residual foci would rapidly eliminate smallpox from the Western Hemisphere.

Endemic smallpox has been banished from Europe, U.S.S.R., Australia, and certain areas of Africa. However, the Eastern Hemisphere still contains major endemic foci. Asian countries provide about four-fifths of the smallpox cases reported worldwide and a major proportion of exportations of smallpox to other countries (4). The African Continent contains the second most important focus.

The establishment of the priority for smallpox control and, likewise for eradication, involves consideration of the relative importance of the disease in the light of mortality, morbidity, and sequelae, and cannot be limited to the magnitude of the problem remaining, with existing control efforts being taken for granted. Rather, future as well as current action is justified by the potential of smallpox in the hypothetical absence of existing control efforts.

Smallpox is one of the most contagious diseases. There is no specific treatment. Prior to the advent of vaccination, susceptibility was universal, and almost all persons were attacked. Those who recovered from the disease were disfigured, if not blind. Fatal in one in every three or four cases, smallpox depopulated cities and nations. During an epidemic in Iceland in 1707 smallpox killed 36 percent of the total population in 1 year.

Despite the prevailing policies of control, smallpox is still only too prevalent in many areas of the globe. With reporting very incomplete, an annual average of 178,000 cases was notified to WHO in the 5 years 1951-55 (4). This situation requires either an extension of complex and continuing systems of control to all areas of the globe or short-term campaigns so placed and timed as to lead to the worldwide eradication of smallpox.

A policy of eradication is favored by the relative amenability of smallpox to eradication. From the point of view of the individual, vaccination is a specific and reliable protection

against smallpox, involving minimal inconvenience. From the point of view of health authorities, no other preventive measure can be extended with such ease, economy, and effect.

Vaccination is unquestionably the most effective of all preventive procedures, having been credited with saving as many lives as all the rest of preventive and curative medicine since Jenner's discovery in the 18th century (5). Now that lyophilized vaccine exists, only the ultimate utility of a thermostabile vaccine remains to be exploited. Full utilization of the vaccine would break the chain of infectious cases on which the smallpox virus depends for its continued existence, carrying disease prevention to a logical conclusion—eradication. Thus smallpox is an anachronism. Thomas Jefferson, an early active supporter of vaccination, wrote to Jenner in 1806, "future nations will know by history only, that the loathsome smallpox has existed."

There is a growing awareness of the national obligation to eliminate endemic smallpox in recognition of the right of other countries to be protected against the reinfection of areas freed of smallpox. Thus the intensified national efforts represent contributions to international health. If it is accepted that the whole world benefits from national campaigns which are an integral part of worldwide eradication of smallpox and that the costs of the campaigns exceed by far the costs of technical assistance, then the more prosperous countries, already freed of smallpox, cannot expect to share the benefits without sharing the cost of the national operations. The alternative is for the countries with endemic smallpox, large populations, and little surplus for investment to assume the major financial burden of eradication.

Mass vaccinations probably can be limited to the endemic foci. Costs, globally distributed, should not be a major obstacle when total costs of vaccination by mobile teams in sparsely populated areas are in the order of 5 cents per capita.

The Eleventh World Health Assembly noted that the funds devoted to smallpox control and vaccination throughout the world exceed those necessary to eradicate sources of the infection. Moreover, eradication represents a capital investment that makes the recurrent costs of con-

trol redundant. The Assembly recommended to all governments that the population be vaccinated where principal endemic foci exist and subsequently where the disease persists. The Assembly also recommended that all countries in which smallpox vaccination is compulsory continue to give smallpox vaccinations during the eradication of this disease throughout the world.

At the Twelfth World Health Assembly in May 1959 the arguments in favor of smallpox eradication were reiterated, and the urgency of worldwide eradication was emphasized. It remains for the governments to initiate timely cooperative action.

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H. Trendley Dean Retires

Dr. H. Trendley Dean retired July 19, 1959, as secretary of the Council on Dental Research of the American Dental Association.

His pioneer research and continuing study on the effects of adding fluoride to city water supplies established Dr. Dean as an international authority.

One measure of his contribution is that a population of 35.6 million persons in 1,800 cities throughout the United States use public water supplies to which fluoride has been added to inhibit dental caries.

Before joining the association in 1953, Dr. Dean was associated for more than 30 years with the Public Health Service.

Dr. Dean's research into fluoridation dates back to the 1930's. During a study of mottling of teeth in communities where there was a high concentration of fluorides in the water, Dr. Dean and his associates observed also that the tooth enamel was unusually well preserved.

This observation led to a long-term study

to determine the level that would avoid staining of the enamel and still check tooth decay.

In 1942, following a study of 21 cities in which more than 7,000 children were examined, Dr. Dean and his fellow scientists concluded that: "Where the fluoride level is about one part per million, there are about 60 percent fewer decayed teeth than in nonfluoride areas."

In 1945, Grand Rapids, Mich., became the first city to add fluorides to its water supply. The measure has been employed since then in communities in Brazil, Chile, Colombia, England, Germany, Holland, Japan, Sweden, and elsewhere.

Dr. Dean expects to continue his efforts in support of fluoridation. He feels more strongly than ever that: "The time is past when fluoridation could be considered a 'progressive' step. It is an integral and routine part of any complete public health program. Cities thus far which have failed to adopt the measure are simply failing in their responsibility to the public."

the fatherless family

PREVENTION of serious family disturbances, rather than their treatment, was the keynote of the biennial meeting of the Family Service Association of America, April 1-3, 1959, in Washington, D.C.

A feature of this new emphasis is family life education. The delegates, representing 286 family counseling agencies, were told that large numbers of people in community groups are being introduced to the basic patterns of human behavior through lectures and demonstrations. Areas of focus in this education program are largely determined by participants to heighten the material's usefulness.

Other papers discussed and analyzed "rejected" fathers in the contemporary mother-dominated family, and analyzed the functional position of the American family, as well as mother-child relations and special problems of the aging.

A topic ranking high among the most relevant and pressing was the fatherless family, on which the following summarizes two approaches.

The Imbalance Factor

Citing the country's large number of broken families, Ruth J. Peterson, district director of the Family Service of Philadelphia, observed that social pressures are no longer sufficient to stabilize marriage; it must be done through inward cohesion. In the fatherless family, that

cohesion is disrupted by an imbalance in the potential for fulfilling each member's needs. The degree of imbalance hinges on the cause of the father's absence, the mother's emotional health, and the level of emotional maturity already reached by each child.

Reviewing recurrent patterns of disturbance, Peterson first turned to those fatherless through an act of fate. Normally in such a family, she explained, each member adjusts to loss of the father, through an individual sense of identity. None feels permanently destroyed, nor does he feel to be the destroyer. When healing is blocked, as in most cases referred to social agencies, the first task is to analyze the reactions to crisis and to sift for emotional factors. Significant are the emotional currents between the parents at the time of death and the way the mother is meeting her own dependency needs. For example, out of guilt over her hostility to the father for leaving her, is she tied to following his instructions? Does she gratify her needs through her children, thus hindering their further emancipation? Is there psychosexual regression to the preoedipal period, bringing rivalry with the children.

After loss of the father, the children's attachment to the mother heightens, often with strong ambivalence. On the whole, the children's reactions reflect the mother's demands and the level each had reached in resolving the oedipal conflict. Peterson offered the following illustration. Mrs. W., whose husband died

after a 2-year illness, was still hostile to her mother for a lifetime of demands, including care of siblings. Feeling little worth as a woman, she resented her husband's domination and his failure to share child discipline. Following treatment which allowed venting her hostility, she supported treatment of her daughter, who had withdrawn from her friends in what was diagnosed as anxiety hysteria. The girl projected onto all, the "duplicity" of her father who had died when she was "unprepared." By airing her oedipal fantasies and working through her anger, mother-daughter relations gradually improved.

Sometimes early help to the mother might have resolved the conflicts of both mother and children, continued Peterson, citing the maladjustment of Mrs. Y. and Andre, which stemmed from this mother's consistent refusal to reveal the father's death to her son. In war-torn Europe, Mrs. Y.'s mother and brother had been murdered shortly before her marriage to Mr. Y., who she felt replaced both. On Mr. Y.'s urging, she consented to come to this country, to avoid responsibility for denying 3-year-old Andre the benefits of growing up here. After loss of her husband 6 months later, she refused an opportunity for higher income in her native land, and only when Andre reached 8, told him of Mr. Y.'s death. Irregular behavior at school followed, leading to casework interviews. They revealed Andre's retarded ego development and hostility to his mother caused anxiety resulting in a mixed neurosis with anxiety hysteria and obsessive compulsive features.

Often disturbances emerge first during adolescence, Peterson remarked, when withdrawal sometimes alternates with aggressive acts. School work suffers; previous defenses no longer suffice; and the adolescent's greatest fear is his loss of self-control. All this may stimulate the mother's unconscious conflicts, her resulting pressure aggravating further acting out which confirms the adolescent's feeling of worthlessness.

Homes Broken Voluntarily

Peterson pointed out that families with the father absent through separation, desertion, or divorce far outnumber other fatherless families

on social agency registers. Here may be the added conflict around reunion and the responsibility for breaking up the home. Most often the mother has been left.

Success in adjustment hinges on the duration, degree, and openness of the marital conflict before the break. Most of these mothers, in Peterson's opinion, lacked the maturity and self-awareness to choose suitable partners, to realistically assess each partner's ability to meet the other's demands, and to understand and adjust to parenthood. They also commonly lacked certainty about themselves in the passive feminine role. Peterson stressed ascertaining at what psychosexual stage growth had been retarded. If in the preoedipal period, for example, receptive needs may be insatiable. Overidentification with the children and identification of one child with the father are also possible.

Diagnostically, it is vital to know the mother's relationship with her parents, asserted Peterson, as in the case of Mrs. G. Her hostility to parental authority had found expression in her marriage to Mr. G., who was illiterate and physically cruel. Her sadomasochistic disorder kept her silent about her husband's incestuous relations with the daughter and abuse of the other children, until known outside. On release from prison, Mr. G. was restricted to another part of the State; the daughter, who had identified with the mother, was helped toward a better reality adjustment; and the oldest boy, with irreversibly defective psychosexual development, was encouraged to broaden his life through wholesome activities. The children's treatment allowed Mrs. G. wider outside interests.

Frequently, stated Peterson, even though there are realistic reasons for ending a marriage, the wife's feeling is one of rejection and failure, the depth of these feelings gauging how much she accepts the feminine role. Symptoms may be depression and projection of blame on the partner. An example was Mrs. N. who developed anxiety with somatization over her adolescent son's visits with the father. Features of her childhood were insecurity, a strict stepmother at age 5, and loneliness during adolescence. Feeling incompetent as a woman, she entered business, was successful, but remained

hurt and rejected underneath. She married a successful businessman, but her feelings of worthlessness led to her uncooperativeness, accusations of belittling her, and finally her leaving. Life then centered in her son whom she pushed toward excellence and controlled through her demands. Threatened by the trauma of desertion, she sought help for herself and her son.

Parents Unwed

Most unmarried mothers, Peterson remarked, have passive masochistic tendencies intensified by guilt feelings which are gratified by illegitimate motherhood. The majority have had much emotional deprivation; many are themselves illegitimate and have been rejected. The result is a feeling of worthlessness and little capacity for objective relationships.

The children may be used to vent hostility to the grandmother, through forcing her to care for them, or as a source of gratification, or to force the father into meeting dependency needs. The children feel stigmatized by lack of a father, for which they blame the mother. A daughter may some day air her hostility by becoming another unwed mother. Boys may have strong homosexual tendencies.

Peterson pointed out that the direct diagnosis and treatment of children's emotional problems, developed during the past decade, put family agencies in a preventive as well as treatment role in relation to the community's fatherless families. In her opinion, until living standards are decent for the minority groups providing most of these mothers, there is no base for developing inherent feelings of self-worth. Another need is an adequate number of trained social workers in public agencies for individual counseling, with financial aid as a basic service. Meanwhile, family agencies can offer a realistic diagnostic and evaluation service as well as supportive help in the use of community facilities for positive sources of identification, such as child day care, leisure time activities, or treatment placement.

Pointing to the growing punitive attitude of the tax-paying public toward families with children born out of wedlock, sometimes expressed in tighter eligibility requirements for

aid, Peterson warned that such efforts to force conformity with social standards ignore the original emotional conflicts which produced the illegitimacy.

Aid to Dependent Children

Legislation which penalizes segments of the indigent population underscores the need for telling people more about the goals of public assistance, especially aid to dependent children, declared Mary Brenz, assistant executive director for social services, Philadelphia County Board of Assistance.

Close to 2 million fatherless children receive aid to dependent children, she reported. Commonly, they are described as born to shiftless women, mostly unmarried, in filthy homes, and growing up into delinquents to retrace the mother's behavior patterns. Evidence to the contrary, she said, is shown in findings of a current, representative study in Philadelphia. The meager aid is generally a stopgap in the child's early years. Also, there is a high degree of social breakdown. In a similar 1953 study, only 3 percent of children covered in this aid program were in neglect cases, and 2 percent in delinquency hearings, not above the city's average.

Brenz pointed to built-in features of the program that bring in many more families broken by discord or lack of planning than by an act of God. A widow's children, for example, are blanketed under social insurance. Cases of desertion predominate. Usually those who plan to break the marriage legally also plan for the future.

In desertions, most frequent in large cities with their opportunities for anonymity, the father may reappear and disappear, making any plans haphazard. This also characterizes the lives of unwed mothers.

Brenz's experience has shown that status is a pervasive ingredient of social breakdown which ends in desertion and illegitimacy. The latter occurs most often among women with little economic or social stake.

She also pointed out that by custom unwed Negro girls tend to keep their babies. Further alliances are more likely to result in more illegitimate children than with those who give up their babies and plan normal lives.

Pinpointing some unresolved questions in casework for the aid to dependent children program, Brenz described the cycle of inherently difficult cases and heavy caseloads, the high turnover of caseworkers, and insufficient rapport between clients and caseworkers. Eligibility terms are often harsh and grants barely provide subsistence.

Broadened Approaches

Brenz pointed out that public agencies, unlike private services, cannot limit their intake, or dispose of cases as untreatable. Many cases covered by aid to dependent children had been abandoned by the highly skilled workers of private agencies. Seeking solutions, Philadelphia has limited caseloads for some workers and used authority in working with public assistance families. Referring to Family Services Units of England, which handles only "hopeless" cases, Brenz outlined a personal approach designed to guide the client. To win the client's confidence, the caseworker may tidy house or scrub the floors.

At this point, Brenz warned against the inadequately trained caseworker translating her own biases unconsciously into standards for

clients. "We already have almost the power of life and death over our clients in that we represent their bread and butter," she said. For effective help to fatherless families on public assistance, she recommended:

- Grants adequate for living rather than for bare subsistence, so that these families really be given "a chance to try."

- Broader information programs about aid to dependent children to help dissolve punitive attitudes into understanding and willingness to support adequate grants and a sufficient and adequately paid staff.

- Guidance from the Department of Health, Education, and Welfare on the desirable pattern and scope of services for public assistance agencies. One area would be the acceptable minimum grant and constituent items.

- Wider cooperation of other social agencies, such as child guidance clinics.

Partnership with other community resources, she concluded, will put the needs of fatherless families into sharper focus.

The papers by Miss Peterson and Miss Brenz appear in full in a pamphlet published by the Family Service Association of America, 215 Fourth Avenue, New York, N.Y.

Study of Medical Care for the Indigent

Means of assuring adequate medical care for an estimated 6 million persons on public relief rolls may be indicated in a study of 20,000 individual welfare records at the University of Michigan School of Public Health. Supported by the American Public Welfare Association, the project began in 1957.

According to Dr. Solomon J. Axelrod, the school's professor of public health economics and principal investigator of the project, "The problem of providing medical care for these people is immensely complex. Many of them were forced onto relief in the first place because they were sick."

During this initial phase of the project, the sample data have been collected from welfare departments in Connecticut, Illinois, Maryland, and Rhode Island. Research is now

focused on the amount and kind of medical care given recipients of old age assistance.

"More and more of the aged are depending on old age assistance for medical care, even while drawing social security payments," Axelrod reported, because these payments "in many cases do not provide enough money for medical attention."

Other objectives of the project are the clarification of certain administrative problems, such as the larger proportion of funds spent on prescribed drugs than on physicians' services in some of the medical care programs for recipients of old age assistance and the question of long-term hospitalization for the aged. Often the elderly have long hospitalizations simply because of the lack of another place to stay, Axelrod remarked.

The Federal Budget Process

RALPH BAHN, M.C.S., C.P.A.

MANY MEDICAL PEOPLE in administrative positions consider budgets and the budget process a form of mystic symbolism and ritual, with its own priesthood called budget officers. Many laymen react the same way to the medical profession. From a layman's viewpoint, the doctor asks some questions, grunts a couple of times, putters around with the patient, sometimes using awesome gadgets, and pontificates a diagnosis. In both situations, lack of understanding of the purposes and specific processes creates uncertainties and possibly fear.

It is hoped that this report on the budget process, by describing the process and the logic behind it, will dispel some of the mysticism.

Budgeting is closely related to financial planning and management, although the term may properly be used in a more general sense of planning. All of us, consciously or unconsciously, do a great deal of budgeting. For example, a family's standard of living is budgeted against its financial resources. The corner storekeeper, formally or informally, budgets his cash outgo to coincide with his estimate of cash income. Larger organizations use similar but more sophisticated techniques to arrive at the same result.

By their very nature, public health activities are financed almost entirely by governmental bodies (Federal, State, county, municipal, and other political subdivisions). Administrators,

or prospective administrators of public health programs, find that budgeting plays an increasingly important role in their professional careers.

There are about 100,000 units of government in the United States (1), including the United States itself, States, counties, incorporated places, towns and townships, and school districts. Many of them have slightly different forms of government. Since budgetary management is intimately related to the political division of authority between the executive and the legislature, in accordance with charters and precedents, the budgetary processes of the various units differ, and no one system can completely fit them all. However, although terminology and the names of the various executive and legislative groups which have roles in budgetary management may differ, certain basic budgetary processes are used by the majority of these units.

The large and varied financial programs of the U.S. Government affect all citizens. Because of the intense interest in Federal programs by many individuals and groups, this report will use the terminology and procedures of the U.S. Government as an example. Because of its vast size and scope, however, this process may be more complex than that of other units of government.

Definition of a Budget

In a nongovernmental organization, a budget is defined as a financial plan of program operation for a specific period of time, expressing the use of men, other services, and matériel in a common denominator: money. In governmental bodies, it means the same thing with the

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additional provision that when a budget is formally approved, certain controlling factors of it become law, and the law is the controlling instrument over financial operations of that governmental body.

The budget is a means of orderly financing which is necessitated by the huge financial programs of modern governments. "In democratic governments it permits the people, through their representatives, to retain control of public finance" (2).

The budget document is essentially an estimate of future governmental income, expenditures, and fiscal conditions. The document also customarily includes a report on the finances of the previous and present fiscal periods. For example, the U.S. budget for 1960 shows actual data for fiscal year 1958, estimated data for fiscal year 1959, and estimated income and expenditures for the budget year, 1960.

The budget process can be defined as the ac-

tivities in the preparation, legislation, execution, and control of the budget.

Types of Budgets

Object classification budget. Many years ago budgets were almost exclusively based on an object classification. This type of budget listed in varying detail the positions to be filled and the specific items of supplies and equipment to be purchased. Sometimes there would be one appropriation for personal services and another for the other object costs of a given organization. Table 1 is a sample of this type of summary budget schedule. In addition to the data shown, these budgets were supported by detailed lists of positions to be filled.

Organizational budget classification. Because of the large numbers of appropriations which can be involved in support of a given department or organization, the appropriations are placed together in the budget and sum-

Table 1. Summary schedule of obligations by objects

<i>Object classification</i>	<i>19-5 actual</i>	<i>19-6 estimate</i>	<i>19-7 estimate</i>
Total number of permanent positions.....	58	60	61
Full-time equivalent of other positions.....			4
Average number of all employees.....	54	50	48
Number of employees at end of year.....	50	49	50
Average salaries and grades:			
Average salary.....	\$6,140	\$6,540	\$6,620
Average grade.....	GS-8.4	GS-8.5	GS-8.5
01 Personal services:			
Permanent positions.....	\$321,520	\$311,900	\$310,500
Regular pay above 52-week basis.....	1,318	1,200
Total personal services.....	322,838	313,100	310,500
02 Travel.....	61,890	54,200	52,800
04 Communication services.....	11,871	12,000	12,000
05 Rents and utility services.....	29,148	30,000	30,000
06 Printing and reproduction.....	416	600	500
08 Supplies and materials.....	242,379	253,000	282,300
09 Equipment.....	5,718	53,000	10,300
Total obligations.....	674,260	715,900	698,400

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Table 2. Summary schedule of program and financing

<i>Program by activities:</i>	<i>19-5 actual</i>	<i>19-6 estimate</i>	<i>19-7 estimate</i>
1. Experimental processing.....	\$377, 561	\$392, 939	\$372, 500
2. Research.....	199, 224	232, 064	241, 200
3. Administration.....	106, 285	100, 897	94, 700
4. Reimbursements from other agencies.....	-8, 810	-10, 000	-10, 000
Total obligations.....	674, 260	715, 900	698, 400
<i>Financing:</i>			
Unobligated balance no longer available.....	740		
Appropriations.....	675, 000	715, 900	698, 400

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marized to obtain a total cost for operating the department or organization. A summary of these appropriations provides an organizational budget classification.

Performance or program budget. Today much emphasis is placed on what is described as a performance, or program, budget, in contrast to budgets based solely either on objects of expenditure or organizational units. The performance, or program, budget as defined by the Hoover Commission is a "budget based on function, activities, and projects . . . which would focus attention on the general character and relative importance of the work to be done, or upon the service to be rendered, rather than on the things to be acquired, such as personal services, supplies, equipment, and so on. . . . The all-important thing in budgeting is the work or the service to be accomplished and what the work or service will cost." Table 2 is a sample of the summary program and financing schedule. This schedule is still supported by the object class distribution listed in table 1.

Cost-type budget. Cost-type budgets are based on data geared to accrual accounting. Accrual accounting, which is generally used in private businesses, bases its costs on actual consumption of goods and services rather than on obligations. Table 3 converts table 2 into a cost-type budget. This is done by merely accruing inventories of goods and services carried

over from year to year. In table 3, in the column headed 19-6, obligations of \$715,900 are adjusted to a cost of \$678,519 because \$37,381 worth of supplies and equipment purchased out of 19-6 monies were not used. In column 19-7, obligations of \$698,400 are converted to costs of \$711,300 resulting from greater use of supplies and equipment in 19-7 than were purchased in 19-6. (Public Law 863, enacted August 1, 1956, provides that Government appropriation requests shall be developed from cost-based budgets in such manner and at such time as may be determined by the President.)

Historical Background

In order to understand reasons for current budget processes, it is necessary to review the conditions and situation which led to budget reform in the United States.

From the establishment of the U.S. Government in 1776 to as late as 1921, "no provision existed . . . for preparation by an agency of a single, consolidated statement of prospective revenues and of the estimated expenditure needs of Government—so prepared as to reveal the relations between the two and to furnish an intelligent guide to Congress of the policies that should be adopted by it in respect to increase or decrease of taxation, the incurring or eliminating of debt and the voting of funds for the conduct of the U.S. Government" (3).

Estimates were prepared by the various departments and submitted to the Treasurer of the United States. The Treasurer, in turn, passed them on to the Congress without review as to need, duplication of services, or available revenue. The President had little or no function in the budget process.

"In the House of Representatives, the estimates were reviewed by eight distinct committees, each acting independently of the others, and no one having overall responsibility for relating expenditures to available resources and prospective income" (3). Sometimes different committees reviewed separate portions of a department's estimates with the result that the de-

partment could shop the "easier" committee for appropriations.

The system for handling finance measures in the Senate repeated all the mistakes in the House and added a few more.

"In addition, conference committees, reconciling appropriations bills between the versions approved by the two legislative bodies, violated their own rules of procedures by changing items beyond the areas of disagreement" (3).

Similar chaos existed in most State, county, and municipal governments up to the early 1900's.

This system of fiscal anarchy was tolerated in the Federal Government because of its rel-

Table 3. Summary schedule of program and financing adjusted for accrual

<i>Program by activities:</i>	<i>19-4 actual</i>	<i>19-5 actual</i>	<i>19-6 estimate</i>	<i>19-7 estimate</i>
1. Experimental processing.....		\$369, 225	\$370, 510	\$380, 200
2. Research.....		194, 222	218, 607	245, 900
3. Administration.....		105, 729	99, 402	95, 200
4. Reimbursements from other agencies...		-8, 810	-10, 000	-10, 000
Total costs.....		660, 366	678, 519	711, 300
<i>Relation of costs to obligations:</i>				
Increase of costs of selected resources available for future application to activity costs (see below).....		13, 894	37, 381	-12, 900
Total obligations.....		674, 260	715, 900	698, 400
Unobligated balances no longer available..		740		
Appropriations.....		675, 000	715, 900	698, 400
<i>Selected resources at June 30:</i>				
Supplies and materials.....	\$8, 804	3, 225	5, 000	-1, 000
Prepaid expense.....	2, 263	1, 847	1, 200	800
Equipment.....	3, 727	17, 342	50, 000	60, 000
Accrued depreciation.....	-704	-2, 606	-4, 000	-9, 000
Unliquidated obligations.....	835	9, 011	14, 000	2, 500
Total selected resources.....	14, 925	28, 819	66, 200	53, 300
Increase or decrease.....		13, 894	37, 381	-12, 900

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ative prosperity and the fact that Federal taxes were almost entirely indirect and scarcely felt by the individual taxpayer.

The rapid development in the scope and amount of governmental expenditures, with an increasing burden of taxation on individuals, focused popular attention on the problem of obtaining more efficient administration of governmental units and led to the adoption of modern budget procedures by the Federal, State, and local governments.

Budget Reforms

In 1921 passage of the Budget and Accounting Act led to a reorganization of Federal financial operations.

The most important change brought about by this act was to place upon the President direct and complete responsibility for preparing and submitting to the legislature, at the beginning of its regular session, a budget which would represent his administration's work and financial programs and his recommendation for financing them. It also prohibited any other employee of the executive department from submitting any other budget recommendations unless requested to do so by a member of Congress. By implication, this also prohibited any executive department employee from submitting any general legislative recommendations which could lead to the need for new funds. The act also provided the President with staff to assist him in handling the financial management of the government. This organization is called the Bureau of the Budget. (Originally established in the Treasury Department, it was transferred to the Executive Office of the President in 1939.)

The 1921 act also authorized an audit staff, under control of and reporting to the legislature. This staff, called the General Accounting Office, reviews the execution of the administration's work and financial programs. Executive department officials, seeking clarification of legislative intent in connection with ambiguous legislative language, may obtain legal opinions from the General Accounting Office to avoid error or criticism.

Concurrently with the passage of the Budget and Accounting Act, both the House of Repre-

sentatives and the Senate amended their rules of procedure to require clearance of all appropriation requests through a single committee on appropriations in each House. In addition, they agreed that the committee on appropriations shall not have power to report bills containing general legislation and that a separate committee would handle all revenue bills.

Subsequent amendments to the Budget and Accounting Act of 1921 have tended to increase the authority of the Bureau of the Budget and the President over governmental fiscal operations.

This general pattern of reform adopted by the United States has been adopted also by many State and local governments.

The Budget Process

The Federal budget process is necessarily continuous. With regard to annual appropriations, the process requires constant review of the current year's program and review and cleanup of previous years' activities. Concurrently with these reviews, plans must be made for 1 or 2 years in the future. For example, agencies are operating under fiscal year 1960 funds, liquidating obligated balances of prior years, preparing 1961 estimates for processing through the Bureau of the Budget and the Congress, and developing plans for the 1962 preliminary estimates.

Omitting the overlapping in the various budgets, a typical budget calendar is outlined on p. 788 and the cycle for a single annual budget is reviewed below. If the preliminary estimates were excluded and the names of participating organizations and possibly the time intervals were changed, the calendar would have many similarities to State and local budgetary calendars and processes.

Preliminary Estimates

Each spring, the Bureau of the Budget makes a fresh review of the budget outlook for the Government as a whole. This review is used as a basis for determining policies to be recommended to the President for use by the agencies in the preparation of their formal budgets. To assist in this review each large agency develops a preliminary estimate, which is a broad pro-

Calendar for 1960 Budget Estimates, Bureau of Medical Services, Public Health Service

(Annual Appropriation)

Preliminary Budget Estimates

January 1958

Bureau issues call for 1960 preliminary estimates from divisions. Large divisions request data from field installations.

April 1958

Divisions summarize, review, adjust, and recommend their estimates to Bureau. Bureau summarizes and reviews estimates, and passes on approved Bureau estimates to Surgeon General.

May 1958

Surgeon General summarizes and reviews all Public Health Service estimates, and passes on approved Public Health Service estimates to the Secretary of the Department of Health, Education, and Welfare.

May 1958

Department compiles and reviews all constituent estimates and submits them to Bureau of the Budget.

June 1958

Budget Bureau summarizes all Government estimates, reviews programs, compares costs with estimates of income, and recommends budget policies to President. President approves governmental budget policies and level of operations.

July 1958

Department and Budget Bureau negotiate authorized budget allowance. Sum of all departmental estimates cannot exceed agreed-upon total. Department allocates budget authorization among constituents. Public Health Service, as a constituent, subdivides its allocation among its bureaus and divisions.

Formal Budget Estimate

September 1958

Department submits formal budget estimate to Bureau of the Budget.

November 1958

Budget Bureau "marks-up" formal budget submission and consolidates estimates in the Budget of the United States Government.

November 1958

Divisions prepare congressional budgets based on "marked-up" budget to be published in the Budget of the United States Government for fiscal year ending June 30, 1960.

Legislation

January 1959

President gives budget message to Congress.

gram document outlining the agency's current and future operating and financing programs.

In developing the call for preliminary budget estimates, each echelon of Government outlines its basic policies and assumptions within the framework allowed by higher echelons. For example, a department may list its basic policies and assumptions for the preparation of department estimates. Within this framework, bureaus and divisions may add criteria which do not conflict with the criteria of the higher echelons.

To justify budgetary estimates more fully, many Government agencies obtain participation in formulating the preliminary estimates at the lowest organizational level at which this is feasible.

The call for estimates requires each supervisory level to review existing programs and make decisions on whether or not program emphasis should be modified, based on changes arising from conditions, resources, or accomplishments.

Each supervisory level summarizes and re-

Calendar for 1960 Budget Estimates—Continued

February 1959

House subcommittee on appropriations holds hearings on estimates. Witnesses from divisions, bureaus, Service, and Department defend them.

March 1959

House Appropriations Committee reports out recommendations. House acts on recommendations.

April 1959

Senate subcommittee on appropriations holds hearings.

May 1959

Senate Appropriations Committee reports out bill. Senate passes bill.

June 1959

Conference committee from both Houses irons out differences, if any. President signs bill, enacting bill into law.

Apportionment

June 1959

Divisions request Budget Bureau apportionment of funds appropriated.

Allotment

June 1959

Divisions notify field stations of annual allocation and issue allotments of first quarter funds, in accordance with approved apportionments.

September 1959

Divisions issue second quarter allotments.

December 1959

Divisions issue third quarter allotments.

March 1960

Divisions issue fourth quarter allotments.

Reporting

Monthly, fiscal year 1960

(July 1959–June 1960)

Each echelon reviews monthly reports on obligations and expenditures. Compares with allotments and apportionments.

Cleanup of Funds Not Available for Obligation

July 1960–June 1962

Public Health Service closes out fiscal year 1960 accounts.

views the estimates of its subordinate levels. This review (a) checks compliance with policies, (b) eliminates duplication, (c) adjusts the various estimates for balance within that program level, and (d) recommends estimates to the next higher echelon. In this way, estimates are built like a pyramid for a division, a bureau, a department, and finally the U.S. Government.

Most Federal budget appropriation requests are submitted to the Bureau of the Budget and the Congress only for activities for which basic legislation exists. (Basic legislation is law authorizing the Government to do something new or extending existing authorization to continue something already being done.) This practice, based on precedent established by the President in 1921, serves two purposes; (a) it avoids placing pressure on the executive department to request appropriation of funds for activities, no matter how desirable, not yet approved by the Congress, and (b) it avoids

legislation subject to easy defeat by a "point of order." Basic legislative items appended to an appropriation bill in violation of existing congressional rules may be eliminated by any member of Congress, during the course of debate on the bill, simply by raising a "point of order."

The Bureau of the Budget consolidates the preliminary estimates of the large agencies and adds an informal estimate for the smaller ones to determine total governmental fiscal requirements for proposed agency programs. These requirements are compared with estimates of revenue to provide the budget outlook for the Government as a whole.

The Director of the Budget Bureau meets with the agency heads individually to discuss the agency's budget in relation to the overall fiscal outlook. In these meetings the agency head reviews his organization's operations and summarizes the need for his proposed programs.

After carefully weighing overall budget objectives against the policies' effect on the programs and responsibilities of each of the larger agencies, the Director of the Budget Bureau recommends to the President the policies to be followed in the preparation of the formal budget. Proposed budget policies and their impact on agency programs are discussed by the President with members of his cabinet.

The President determines the policies to be followed by the agencies and the overall budget objectives of the Federal Government. The objectives may be, for example, a balanced budget, emphasis on national security, and increased international aid. On the basis of these policies and objectives, the President determines the level of governmental expenditures desired. If expenditures are planned to exceed revenues, the President proposes additional taxes or an increase in the Federal debt to finance the excess. If revenues are expected to exceed expenditures, the surplus may be applied to reduce the Government debt.

The President's determination on governmental expenditures is made available to the agencies in the form of a budget allowance, which sets the maximum amount that the agency may request in its formal budget for the fiscal year under consideration. The budget allowances are then allocated by the agency to its bureaus and divisions.

As stated previously, the President is responsible for submitting a budget for his work and financial programs. He is not required to recommend appropriations to the full extent of basic authorizations. He may recommend a lesser amount or no funds at all.

In the evolving budget formulation process, the preliminary estimate appears to be assuming more and more importance in determining the programs to be supported. All governmental budget estimates are highly competitive. They are alternate bids for use of a scarce item: the tax dollar. In the competition for use of this item, a budget proposal generally must be approved in the preliminary process if it is to be included in the formal estimate.

Formal Budget

The budget allowances by the Budget Bureau generally require reductions in program plans

proposed in preliminary estimates. When the reasons for the reductions are given or the items to be eliminated are identified, the agency will generally give serious consideration to the Budget Bureau's suggestions. To include items not favored by the Budget Bureau in the formal estimate is to risk having the item eliminated again in the Budget Bureau's review of this estimate and thus lose authorization which might have been allowed for another desirable purpose.

When the bases for the reductions are not identified, the person responsible for the appropriation programs will determine where cuts are to be made. Although the basic budget data for an appropriation may have been developed with full participation of field staffs, the pressure of time in the processing of the formal and congressional estimates may preclude their further participation.

The departments are generally informed of their budget allowances in July, and they are required to submit their formal budgets no later than September 30. These formal estimates must be prepared in accordance with the allowance limitation and the procedures set forth by the Budget Bureau (4). They list in detail how the requested funds will be spent.

In order to point up important requirements that cannot be accommodated within an appropriation allowance, a supplementary, or "B," budget is sometimes submitted with the formal estimate. The "B" budget is evaluated by the Budget Bureau with the formal estimate, and if the Bureau considers it important enough, it will include funds for the item in the appropriation request.

In October or November the Bureau of the Budget holds hearings on the formal estimates. These afford the Bureau another review of an agency's programs some 5 months after submission of the preliminary estimates. At this time the Bureau may make further adjustments in an agency's budget based on current conditions. Budget Bureau examiners question agency officials, and they may ask them for additional evidence to support their estimates or to revise them. The Director of the Budget Bureau and the agency head endeavor to reach substantial agreement, but the secretary of a

Selected Budgetary Terms

appropriation, a statutory authorization to a government agency to incur obligations (obligate) for not more than a stated sum of money, for specified purposes, often within a stated period of time. Several of the more important types are defined below.

annual appropriation, an authorization available for incurring obligations for 1 year only. Most common type in the Federal Government.

multiple-year appropriation, an authorization for incurring obligations for a definite period of time, but in excess of 1 year. Used for seasonal programs or for nonrecurring programs that do not fit into a fiscal year pattern.

no-year appropriation, an authorization available for obligation until the purpose of the appropriation has been accomplished. Used for such work as construction projects, certain research and development programs, and long-lead procurement programs.

appropriation limitations to accomplish specific objectives may be imposed by the legislature; for example, a limit on the amounts which can be spent for specific purposes or a requirement that a minimum amount be spent for a certain purpose. An appropriation on a lump-sum basis for several pro-

grams gives the agency some discretion in varying the use of the funds among programs, but an appropriation specifying the amounts for each program has the effect of imposing a separate limitation on each item very similar to separate appropriations.

apportionment, distribution of an appropriation into amounts available for specified time periods, activities, functions, projects, objects, or combinations of these. Amounts so apportioned limit obligations to be incurred. Generally, apportionments are used to limit obligations for specific time intervals, usually quarters, over the appropriation period in order to prevent organizations from running out of obligational authority before the end of the fiscal period and thereby incurring a deficiency.

allotment, an authorization by head of the agency or his designee to incur obligations within a specified amount pursuant to an appropriation and apportionment. It is a method of subdividing apportioned funds.

obligation results when goods and services are ordered. When they are received, the obligation becomes a legal liability to pay for their purchase.

encumbrance or commitment, the current reservation of funds for a specific future payment.

department may appeal differences on significant items to the President. Subsequently, determinations by the Director of the Budget Bureau and the President are communicated to the agency.

In December, approved budget estimates for all the agencies are brought together and made part of the President's budget document. This is delivered to the Congress together with the annual budget message during the first 15 days of the session beginning in January.

All budget estimates are administratively confidential until released by the President in his budget message to the Congress.

Other Estimates

Amended, supplemental, or deficiency estimates may be submitted to the Congress with the approval of the President (a) to finance programs resulting from enactment of new leg-

islation, after the regular budget has been submitted to the Congress or (b) to meet emergencies or conditions under existing legislation not anticipated when the original budget was prepared.

Legislation

Constitutionally, the House of Representatives originates all revenue-raising bills. The House has uniformly held that the section of the Constitution authorizing it to originate revenue bills (art. 1, sec. 3) was intended to cover appropriation bills as well. Although the Senate has at times questioned this claim, it has generally abided by it.

All appropriation requests are submitted to the House Committee on Appropriations (except that after passage of the appropriation bill by the House certain urgent items may be submitted directly to the Senate Committee

on Appropriations). A single subcommittee of the House group considers appropriation bills for one or more agencies. The subcommittee studies the material in the budget, consults with its staff employees, and holds hearings at which the agency head and other key officials are asked to appear. Members of the subcommittee may question them on any point relating to the proposed budget in order to assure themselves that any money appropriated will be spent for approved purposes.

In appearing before congressional committees, agency witnesses are required to defend the President's budget. This requirement is implied, as pointed out above, from the section in the Budget and Accounting Act of 1921 which directs the President to submit a budget of his work and financial programs and prohibits any other employee of the executive department from submitting any other recommendation unless requested to do so by a member of Congress.

Only when specifically requested by a member of Congress may the agency witness offer an opinion or estimate which would be critical of the budget document.

The subcommittee makes its recommendation to the full committee on appropriations. The full committee's recommendation is introduced into the House, accompanied by a printed report that summarizes the programs to be financed and the comments of the committee with respect to them. After debate, the House approves the bill and passes it on to the Senate.

Senate consideration follows substantially the same pattern, and ultimately the appropriation bills are passed by this body.

Differences between the House and Senate versions of appropriation bills are negotiated by "conferees" appointed by each House. Conferees are authorized only to act on differences. They may not consider items not in dispute, but within the range of differences, they have complete freedom to negotiate. Conference recommendations are subject to approval by each House.

When a bill is agreed upon by both Houses of Congress, it is submitted to the President. When he signs it, the appropriation bill acquires the status of a law.

Execution and Control

Enactment of an appropriation bill does not automatically make funds available for use. The funds must first be apportioned by the Budget Bureau. As explained in the glossary on p. 791, apportionment is a method of approving the use of appropriated money generally on a time-interval basis, usually quarterly, to avoid deficiency appropriations. The Budget Bureau also uses the apportionment process to review again the budget program, in light of current conditions, before it is put into operation.

The Budget Bureau has the authority to withhold funds and place them in reserve "to provide for contingencies, or to effect savings whenever savings are made possible by or through changes in requirements, greater efficiency of operations or other developments subsequent to the date on which such appropriation was made available" (5).

In the absence of any specific information to the contrary, funds apportioned and unused in one quarter are automatically available in the succeeding quarters within the budget period. In an annual appropriation, apportioned and unused funds cannot be carried over to another fiscal year without legislative approval.

After funds are apportioned, they are allotted by the head of the agency, or his designee, to the person responsible for the operating program. This individual may reallocate or suballot these funds to lower program levels.

Each allottee is liable to remain within the limits set by the allotter. Every violation, technical or otherwise, must be reported to the President through the Budget Bureau and to the Congress. These reports outline the circumstances of the violation and the action taken against the allottee, if it was due to his negligence. They also review the adequacy of the system of control to prevent recurrence of a deficiency.

In order to obtain maximum efficiency in the use of budgeted resources, provision must be made for continuous statistical and financial evaluation of programs. Data obtained should be used to inform management, at all levels, of changing patterns of program operations. They provide a basis for program evaluation of

past activities in comparison with the budget and for forecasts of future workloads or fund needs. Each echelon performs its own evaluation on its level and scope of the program.

Periodic financial reports (generally monthly) on the status of allotments or suballotments are an important part of this evaluation. They are submitted from each accounting level to the program chief. Generally, only appropriation reports are submitted to the Budget Bureau, but the Bureau may request such data as it deems necessary (6).

In order to permit operating evaluations in relation to the budget, expenditure accounts should be kept on a functional (program) classification basis consistent with the budgetary classification, or they should be capable of being summarized on such a basis without analysis or adjustment.

The process of review is continuous until the period for which the appropriation is available for obligation expires. At that time unobligated balances are no longer available for use and they are withdrawn.

Sometimes the periodic evaluations show a need to shift funds, within one program activity, from one geographical area to another. This kind of shift is ordinarily within the authority of the program chief. However, an indication of a need for shifts between activities may present complications.

If funds have been appropriated on an individual-activity basis within a budget, no changes between activities are possible without legislative approval. When the appropriation is for a lump sum of money covering several activities, program chiefs may obtain minor adjustments among the activities from higher authority as designated by the head of the department without further clearance. Significant shifts of funds between activities will ordinarily be cleared, prior to the shift, with the Bureau of the Budget and even the chairmen of the congressional subcommittees which normally review the program's budget esti-

mates. This clearance is made to avoid, in subsequent budget hearings, any question as to the agency's good faith in submitting budget estimates.

Since an appropriation limits the funds to be used, some balance must be retained and lapsed to protect the appropriation from a deficiency. Unrecorded obligations must be charged against appropriations for the year in which obligations were incurred. This may occur at any time up to 2 years after the close of the budget year before obligated balances of funds are merged and lose their time-period identification.

Conclusion

The budget can be a source of frustration to a program person who sees a need for spending more money than is available. The needs are as many and as varied as the programs sponsored by governmental units. The pressures for greater expenditures, however, are offset by the pressures of the people for limiting or reducing taxation. In a democratic society, the balance of governmental wants and satisfactions are adjusted slowly as the people express their wishes through their elected representatives.

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Signs

and

Symptoms

of trends in public health

The annual report of the New York State Bar Association's public health committee recommends passage of a law enabling drug addicts to receive certain narcotics from public health clinics or registered physicians as a means of breaking criminal drug traffic. Heroin would remain outlawed.

« »

A \$7 million 640-unit housing facility for elderly persons is to be constructed with FHA financing in a Las Vegas, Nev., suburb by Senior Citizens Retreat, Inc., an organization sponsored by officers and members of Painters Local 159.

Plans for the 80-acre plot include a 6-story structure of 100 units surrounded by 1- and 2-story facilities of 20-units each. Dining rooms (public and private), lounges, a swimming pool, 9-hole golf course, shuffleboard, bowling, a hobby shop, library, and chapel are a part of the blueprints.

« »

The National Library of Medicine has copied the files of *Public Health Reports*, from 1878 to the present, on microfilm.

« »

About 2,000 persons under 21 years of age are "de-labeled" annually of an erroneously diagnosed heart condition by New York City's six cardiac consultation clinics, Dr. Harold Jacobziner, director of maternal and child health services, reports. He added that many remain trapped in the belief of a physical disability because of a physician's earlier misdiagnosis of an innocent heart murmur.

Of 30,252 cancer patients cataloged by the Tumor Registry of the Connecticut Department of Public Health, 10,556 people have lived 5 years or more with their cancer in check, 4,356 for 10 years or more, and 1,672 for 15 years or more.

« »

A department of virology has been established on the Berkeley campus of the University of California. It is one of the first departments in any university of the world to be dedicated to the study of viruses. Biologists, chemists, and physicists will receive intensive specialized instruction in the biochemical, biological, and biophysical aspects of virology.

« »

Regulations on drug handling in licensed nursing homes were circularized to all Indiana pharmacists and wholesale druggists by the State's division of foods and drugs. Pharmacists and wholesalers requested the service.

One requirement of the regulations is a legitimate prescription bearing the patient's name. A program of inspection and licensing of nursing homes in the State is being carried out by an especially trained field staff.

« »

Pennsylvania's secretary of health, Dr. Charles L. Wilbar, Jr., has ordered Glyco Chemical Corporation of Williamsport to stop discharge of cyanide wastes from its plant into a tributary of the Susquehanna River. Dr. Wilbar's action was ratified by the Sanitary Water Board of the State.

Scientific writers will find guidelines for pamphlet preparation in "Pamphlets, How to Write and Print Them," by Alexander L. Crosby, published by the National Publicity Council for Health and Welfare Services, Inc., 257 Fourth Avenue, New York 10, N.Y.

« »

A new city health code was enacted in March 1959 by the New York City Board of Health. It will become effective October 1.

The code, the result of work in progress for 3½ years, is divided into five titles: general powers of the department of health; communicable disease control; maternal, infant, child, and school health; environmental sanitation; and records and vital statistics.

Deleted are obsolete provisions such as the requirement that barber-shops, hair dressing and beauty parlors provide cuspidors, and the responsibility of the department to mark the location of dead horses on city streets by placing lighted lamps at their heads at twilight.

Added responsibilities under the new code are control over radioactive materials and X-ray machines, chemical food additives, medical laboratories, and day care centers for children.

Dr. Leona Baumgartner, the city commissioner of health, commented: "The old code was bacteriologically oriented. We realize now more than we did 45 years ago that our environment is more than bacteria. The new one continues the safeguards and broadens the scope to protect us against other hazards."

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One-half of the accidents which put farm residents in the hospital occur in farmyards with children the most frequent victims, it was found by the accident prevention program of the Saskatchewan Department of Public Health, Canada. This finding launched a "safe play areas for farm children" project. Farmers are being supplied with do-it-yourself blueprints of simple and safe play equipment which they can make during winter months.

Economic Costs of Disease and Injury

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WHAT is the cost of sickness and the price of health? What are the costs and prices of alternative health activities and how much should be spent for control of a disease as compared with other programs? What can we afford to do, and afford not to do, in meeting disease problems?

Such questions are raised repeatedly about the costs of specific diseases and about comparative amounts spent for prevention and treatment. These are issues which quantification of costs and prices cannot resolve alone; but, as Winslow emphasized, such quantification can provide a most valuable tool to assist in consideration of these issues (1).

The arithmetic of economic gains and losses brought about by health programs can be an important tool, especially in planning for economic development in parts of Asia, Africa, and South America. For these countries, the real price of health programs often includes not only expenditures for public health programs but also costs occasioned by pressures of population growth. These pressures have been intensified by a marked fall in death rates from the application of modern public health measures and techniques. It has been estimated, for example, that the introduction of modern medical technology into some of the nonindustrial nations has resulted in a decline in mortality and a net increase of 1 to 2 percent in population per year.

While cost-price equations have more urgent application in health programing in nonindustrial nations of the world, they also apply to

health programing in the United States. They supply a tool for appraising the adequacy of resources devoted to specific health problems and the comparative economic returns from public investment in different disease problems. They permit a summary type of comparison between the costs of a specific disease and the price of the health care associated with the disease. With this type of summary in view, the National Health Education Committee collects information on the major killing and crippling diseases in the United States (2).

Review of existing work on costs of specific diseases and health programs, however, suggests a need for clarifying cost concepts in current use, setting forth in a summary way the information now available to estimate costs, and assessing the additional information required. This paper attempts to meet this need by setting forth a tentative classification of costs based on their effects on the use, distribution, and quantity of economic resources, which may help clarify the concept of economic costs of disease. In the context of each of these cost components, the types of information available for measurement are discussed and the additional information required is summarized.

Economic costs, as we are viewing them here, arise out of the impact of disease and injury upon economic resources. The question we must ask is: What is the difference between what actually happens in the economy now and what might happen in the hypothetical situation where sickness from specific causes is eliminated? In other words: What is the impact of a disease upon the use, distribution, and availability of economic resources?

Economic costs may be more sharply de-

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fined into three types: The first is actual use of economic resources (manpower and materials) for prevention, diagnosis, treatment, and rehabilitation. This represents the direct price of health programs; it is measured by actual expenditures, both public and private, for health services and their complement of commodities and facilities. In the absence of disease, these expenditures would not be necessary. The second type consists of transfers (of resources or of income) which arise out of mitigating the burdens of sickness. Costs in this category do not, in the first instance, affect the total resources used up by sickness in the economy as a whole, but they do affect the distribution of resources among individuals or families. Many of these transfers are designed to mitigate the impact on family income of losses due to death or disability. The third type, less clearly defined but perhaps more pervasive in effect than either of the other two, is loss of resources occasioned by sickness—human resources lost or impaired as a result of death, disability, and debility caused by sickness.

For convenience, we will call these three categories of cost resource-use, resource-transfer, and resource-loss. Other classifications have been used. Dr. Raschi Fein, in a recent work for the Joint Commission on Mental Illness and Health, used direct and indirect cost to refer to resource-use and resource-loss respectively. He combined the transfer category with direct costs (3).

Resource Use

Each of the major diseases and disabilities requires the use of manpower and material for prevention, treatment, and rehabilitation. If it were not for disease and injury, these resources of men and material could be used to produce other want-satisfying goods and services. The actual use of these resources in the health industry thus constitutes the type of cost of sickness that we have termed resource-use.

Available estimates suggest that the part of the Nation's manpower and of goods and services produced that is devoted to health care has increased in recent years. In 1929, the Committee on the Costs of Medical Care estimated

health and medical expenditures at \$3.9 billion (4), or 3.8 percent of the gross national product; an estimate by the Social Security Administration for 1957 showed that the health share of the Nation's output had risen to 4.7 percent (5).

The resources directly devoted to the research, prevention, diagnosis, treatment, and rehabilitation in a specific program or disease category are represented by the outlays of public and private health agencies, employers, and individuals and their families. They include expenditures for (a) health services provided by physicians, hospitals, dentists, nurses, and other health personnel; (b) complementary commodities such as drugs, prosthetic appliances, and medical supplies; (c) public health programs, including, for some disease categories, environmental health services; (d) medical research; (e) a part of costs of training health personnel; and (f) a part of capital expenditures for construction of health plant and facilities used in the provision of health services and the production of complementary health goods.

While progress has been made in the development of estimates for global health expenditures which encompass most of these categories of outlays, figures in current use for specific diseases fall far short of even a complete count of expenditures for hospital and physician services, both public and private (2,3,6).

Estimates of expenditures by disease category may be approached and combined from available data in several ways. The following summary of methods consists partly of alternative approaches and partly of methods for approximating additive segments.

1. Data on average cost per case of a disease times number of cases give a rough approximation of total cost of a disease.

2. If the average cost per case is not known, average duration of hospital care, times number of cases, times cost per unit of service, plus average drug use times costs of other health services yields a similar approximation.

3. Expenditures (both current and capital) of hospitals and nursing homes specially designed for a specific disease can indicate the costs, as can the allocation of expenditures of general hospitals (or nursing homes) based on hospital use by diagnosis.

4. Expenditures for specific disease-connected com-

modities complementary to health services, for example, eyeglasses and hearing aids, identify special costs connected with some conditions.

5. Number and income of providers of services whose specialty relates to a disease category, such as psychiatrists and ophthalmologists, are indicators of special costs.

6. Expenditures under public and private agency programs earmarked for services, research, or prevention in a special disease category provide a source of costs.

7. Allocation of "overhead" costs, such as costs of training health personnel and construction of facilities, to a disease category can be based on some index of relative importance like number and use of personnel and facilities.

There are several possible methods of combining these approaches. Expenditures can be classified in terms of who pays the bills, either initially or ultimately. Much of the information now available on aggregate health expenditures in the United States is classified in this way: by expenditures of Federal, State, and local official agencies, insurance carriers, employers, and private persons (5, 7). Another classification is by the category of services purchased, for example, dental or hospital (8, 9). A third classification is by age group of patient. Recently, a World Health Organization study suggested still another type of classification based on a rough index of the physical status of the patient, that is, whether the patient is in a hospital, is ambulatory, or is at home on his back (10). In each of these classifications, preventive services may be distinguished from curative services, and current outlays from capital outlays for plant and physical facilities.

Sources of data for estimating the resources consumed by a specific disease vary by the nature of the disease, the identification of medical specialties and special hospitals with the disease problem, and the extent of identifiable public and private support for the agency program. Some of the source data represent national compilations of statistics on facets of expenditures, but for the most part the materials must be drawn from special regional or community studies. References to such special studies are compiled by the clearinghouse on morbidity projects of the Public Health Service (11) and by the Health Information Foundation (12). Detailing each source of data for estimates on expenditures for specific disease categories is

outside the scope of this paper. The general types of source data, however, are as follows:

Public hospital expenditures. Data on mental hospitals are compiled annually by the National Institute of Mental Health, Public Health Service (13); expenditures on tuberculosis hospitals and tuberculosis control are compiled by the Bureau of State Services, Public Health Service (14). In some communities, information has been tabulated on public hospital use by diagnosis, for example, morbidity in New York City's municipal hospitals (15). Similar material on Federal hospital use by diagnosis is brought together by the Veterans Administration, the Public Health Service, and the Defense Department and is being collected as a byproduct of the administration of the medical care program for dependents of the uniformed services.

Other public expenditures. Data are available on research and related training expenditures for specific disease categories for which separate appropriations are made by the Congress. These amounts are published as part of the U.S. budget and also in the reports of the National Institutes of Health (16).

Household surveys of health service costs per illness case. A number of special household surveys have been made on the nature of illness in population groups, including medical services received and cost of such services. The North Carolina Agricultural Experiment Station, for example, has made such a study from samples of population in Stokes and Montgomery Counties, N.C. (17). The Research Council for Economic Security has studied the volume of prolonged nonoccupational illness among 400,000 employees in private nonagricultural employment, and the types and cost of treatment (18); a survey in Lyon County, Kans., included data on amount and types of different health services as well as costs of hospitalization and cause of hospital care (19); and the Kansas City regional health and hospital survey also included information on both health services and conditions reported (20).

Surveys of patients. A number of different types of sample surveys have been made of persons in hospitals or other institutions and of physicians' patient loads which include, along with diagnostic information, data on use

of the different classes of health services, or cost of care or treatment. One example is the Dane County, Wis., survey of services and cost of treatment of the aging and long-term patient (21). A nationwide study of all patients discharged in a week in 1956 by hospital use and diagnostic category as well as of physician services received has been made by the Bureau of Medical Economic Research of the American Medical Association (22). A nationwide study is reported to have been made of drug therapies and morbidity reported by physicians based on case records kept on patients seen in private practice during a 2-day period.

Prepayment plan and insurance carrier data. Some compilations have been made of the experience under prepayment plans such as Health Insurance Plan of Greater New York and Kaiser-Permanente indicating volumes of selected health services for different conditions or hours of professional work time involved for different procedures (23-26). Insurance claims data which have been published for special purposes also provide useful materials (27). Fairly detailed data on costs by diagnosis are becoming available in administration of the Medicare program and provide an important source of cost information for the types of conditions to which the Medicare beneficiary group are subject (28).

Census and trade data. For some types of health commodities, such as hearing aids, eyeglasses, and drugs, data are available from the retail, wholesale, and manufacturing censuses conducted by the U.S. Census Bureau and from trade journals such as *American Druggist* and *Drug Topics* (29-31).

Professional income, fees, and hospital rates. The publication *Medical Economics* has put out information from a sample of physicians on gross and net physician income by specialty (32). Fee allowances for specific procedures are set up by Blue Shield plans, Medicare, Veterans Administration, and in the course of administration of other health programs. Hospital charges and costs are available from the publications of the American Hospital Association, regional hospital councils (33), and from public medical care programs. However, these hospital data are not generally classified by disease category.

National Health Survey. Perhaps the most important single source of data by nature of condition or diagnostic category is the National Health Survey (34). From the household surveys, information is being obtained on the condition reported at the time of the interview. In the medical examination survey, information is being obtained on selected conditions for which standard diagnostic procedures have been developed. In both types of surveys, data are being collected on items of medical service use, including hospitalization, physician visits, dental visits, nursing care, and use of specified special aids (hearing aids, artificial limbs, braces, and wheelchairs). Information from the household survey on numbers of days of hospital care and average length of hospital stay have been published for specified hospitalized conditions including malignant neoplasms, heart diseases, arthritis, hernia, fractures and dislocations, and infective and parasitic diseases. Dental visits have been published by type of services received. Other types of services have not been related thus far to the nature of the condition reported.

The various estimates that have been compiled of resources devoted to health services and related commodities on account of specific diseases point up the inadequacies of existing information on which such estimates are based. Additional collection of expenditure data cross-classified by nature of illness is needed.

The problems of collecting information of this type are many. Household surveys are limited by the types of conditions that families are likely to report, and by the undercount of expenditures for terminal cases. Many household surveys omit institutional populations. In addition, with the increase in voluntary health insurance coverage, expenditures for services are paid by the insurance plans and families often have no record of these costs. Other more technical problems include the use of health services and drugs for multiple conditions, the difficulties of obtaining accurate reporting on relatively small expenditure items, and memory biases in reports from households in which detailed expenditure records are not kept.

Small sample studies, moreover, yield an inadequate number of cases on many of the ill-

nesses for which data are sought, such as cerebral palsy cases. The Health Information Foundation in its 1952-53 survey attempted to obtain information from the surveyed families on both expenditures and health conditions but the illness data were not tabulated (35). A review of the information obtained by the Bureau of Labor Statistics in its 1950 survey of urban families on the illness for which the major part of the family's medical care expenditures were incurred indicated that the information reported was too sparse to permit analysis by disease category (36).

Another step in obtaining materials for estimates of expenditures by specific disease category would be to gather more information as part of the National Health Survey. A tabulation of information on physician visits and on practical and professional nurse services by nature of condition would make a beginning toward approaching expenditures through volume of services. Other health service items and commodities might be incorporated on the questionnaire for special analysis. Information on number of prescriptions, X-ray services, ambulance services, laboratory tests, oxygen, transfusions, and on physical and occupational therapy services and public health services might be obtained. It would probably be desirable to develop a series of questions on health services used for several major disease categories on a supplement to the general questionnaire for surveyed families.

Other approaches might be followed in the collection of information, such as a sampling of hospital and physician records to define the classes and volumes of services used in the diagnosis and treatment of the major diseases, and the independent collection of price data for the defined classes of health services and commodities used. Collation of public expenditure data for specified disease categories would also facilitate the approximation of aggregate expenditures for a disease. The National Institute of Mental Health has worked toward the collection of costs of mental illness not only by assisting in improved financial reporting from State hospitals but also by bringing together other data on public expenditures for mental patients, but these data combining

Federal and State mental hospital expenditures are not published.

Resource Transfer

Disease and injury occasion not only a direct use of economic resources for the provision of health services and supporting goods but also transfers of income between the sick and the well. These transfers are costs to the givers, benefits to the receivers; but because they entail a reallocation of resources away from uses which, in the absence of sickness, would be preferred, transfers must be considered in assessing the economic impact of disease.

The size and importance of these transfers in the American economy have increased rapidly in the last two decades. They take two principal forms. One consists of payments made directly to the sick and disabled (or their survivors) and financed from taxes or contributions levied; social security protection under public and private auspices is the principal example. The other is the hidden redistribution of the tax burden that comes about through statutory tax provisions designed to assist families and voluntary agencies in meeting problems arising out of sickness. On both these counts, disease takes resources away from those who are well, and who would otherwise have alternative uses for them, and gives them to those who are sick and to survivors.

Cash Payments

A wide range of cash payments are made to individuals to mitigate the effects of loss of income due to death and disability. It is difficult to distinguish transfer payments attributable to sickness alone. For example, a part of old-age assistance and of old-age insurance benefits are paid because the aged person became disabled and was forced to retire. Under Federal programs, payments are provided to disabled veterans, to survivors and the disabled under the old-age, survivors, and disability insurance (OASDI) program, under the Civil Service system, and under the railroad retirement program. Compensation benefits for work connected with injuries are paid to Federal employees and sickness benefits to railroad

workers. In cooperation with the States, the Federal Government finances payments to the needy blind, disabled, and aged. Under State and local laws sizable cash payments are made to families whose income has been impaired by sickness. These cash payments include workmen's compensation benefits, cash sickness benefits (in four States), benefits under State and local retirement systems, and a part of the general assistance caseload as well.

Figures on these public outlays are available, and give some idea of the magnitude of resource-transfer under public auspices that occurs in our economy as a result of sickness. Disability payments under social insurance and related programs alone total more than \$3.5 billion at the present time (37). Aid to the needy blind and disabled under the assistance program accounts for an additional \$340 million per annum (38).

Private health, sickness, and disability plans have reached major proportions, but data in this area are piecemeal and often incomplete. In 1957, employer contributions to private pension and welfare plans totaled \$7 billion (9). Alfred M. Skolnik, of the Social Security Administration, has estimated premiums paid under group cash sickness insurance plans alone at \$434.5 million. A survey of 3,100 firms employing 6.8 million persons made by the National Industrial Conference Board found that 85 percent of hourly workers and 75 percent of salaried workers were covered under group accident and sickness insurance (39); the benefits for slightly under half of these employees were paid for entirely by the employers, and in almost all the remainder the employers contributed substantially.

Current practice in national income accounting does not define employer contributions to disability, cash sickness, and life insurance plans as transfer of income. They are regarded as supplements to wages and salaries, thus as part of the current return for productive services given. These contributions, however, are essentially pooled and go to finance payments to survivors and to those who are sick or disabled. The benefit payments accordingly represent from our point of view not an addition to national output but a shift in the shares of the national output from all workers cov-

ered to those whose income is impaired by death and disease. However, if sickness were miraculously eliminated it may be assumed that these employer payments would go instead directly into wages and salary compensation for the services.

Data on total benefits for each of the various types of protection are piecemeal and incomplete. For specific disease categories, they are even less adequate. Under the OASDI program, data are available on the number of beneficiaries by disability group and primary diagnosis, although amounts paid are not tabulated in this way (40). Benefits paid to disabled veterans, by broad disease categories, are included in the Annual Report of the Administrator of Veterans Affairs (41), but more detailed figures are not published. Benefits paid under State workmen's compensation programs are not recorded on a national basis, but some States publish data by diagnostic category. Some studies of State temporary disability insurance programs provide information on benefits paid by cause of disability (42).

Hidden Subsidies

The tax structure is increasingly being used to foster redistribution of income in the interests of specific public program ends. This amounts to a form of hidden subsidy. Under National, State, and local statutes there are a wide variety of exclusions, exemptions, deductions, and allowances made for reducing the costs of operating health facilities, for stimulating private giving, for reducing the burden of taxation on families incurring sickness and disability. For every deduction, or equivalent means of reducing the tax on those who are sick, there must be a corresponding increase in some other tax source to maintain a given level of revenue. Tax relief for some groups, for example those who are sick, means larger tax burdens for others. The losses in revenue from those who contribute to health agencies, who take deductions allowed for medical expenses, or who deduct income received as sick pay must be made up in the form of higher tax rates or additional tax levies. This shift in tax burden represents a shift in income after taxes and in the distribution of funds available for consumption among families.

Estimates of the magnitude of resources transferred in this indirect way are naturally lacking in precision. Some illustrative magnitudes may be suggested. Deductions from income on account of medical expense amounted to \$3.5 billion in 1956, the latest year for which data are available (43). Sick leave pay and cash sickness benefits deducted from income amounted to \$1.4 billion (43).

A large part of these costs appear again either as resource-use or resource-loss. The hidden transfers are not generally additive to these other types of cost because they do not represent a change in the total cost to the community as a whole; they represent rather a shift in command over income within the community. Similarly, cash transfer payments in large part represent payments made to individuals and families to partially compensate them for a loss in earnings represented more fully in the estimates of loss in labor product due to deaths and disabilities. Cash transfers included in the resource-loss estimates are not an additional cost item; where they are added there is a double counting (3). However, in the absence of estimates of resource-loss, cash transfer payments as a partial measure of income loss attributable to a disease may be added to resource-use.

Resource Loss

The type of sickness cost we have categorized as resource-use relates to the way in which existing economic resources are diverted to the sector of the economy that produces health services. Without sickness and injury, these health services would be unnecessary and the resources would be free for other productive uses. Resource-transfer represents shifts in command over resources between persons or groups, which may be direct costs to one sector of the economy but are of benefit to another. However, sickness and injury also affect the quantity of resources available in the first place. Disease and impairments cause a loss of economic resources, a loss that would cease if disease and injury were to be eliminated. This is also part of the total economic cost of sickness.

The resource lost as a result of sickness is human labor. In order to value the loss in dollars, it is necessary to estimate the output

foregone. The question is, if there were no sickness how much would those persons who are now sick have produced?

The effects of sickness upon the amount of human labor available for productive purposes can be summarized under three heads: deaths (loss of workers), disability (loss of working time); and debility (loss of productive capacity while at work).

Essentially, there are two stages in calculating the output foregone: (a) estimating the loss in productive work time, and (b) assigning a money value to the output that this lost work time represents. The result is then a dollar figure which represents the value of the loss in output attributable to deaths, disability, and debility. In other words, it is a rough estimate of the increase in output that would occur if the loss of resources due to sickness were eliminated.

In view of the conceptual difficulty of the idea of resource-loss, we will explain the problems involved in arriving at an estimate at somewhat greater length than we have done for resource-use and resource-transfer.

Conceptual Problems

An estimate of work-loss due to a disease involves the assumption that, if it were not for the disease, those persons in the productive age groups stricken by the disease would have been employed. In fact, where there is unemployment or substantial underemployment, improved health may result in more unemployment rather than more output. One obvious reason for using the simplifying assumption of full employment is that unless we do so we cannot arrive at any definite concept of what the resource-loss is. Apart from this, however, the fact that production losses resulting from poor health cannot be realized in an unemployment situation should be attributed to unemployment, not to ill health. Unemployment has its own costs which in effect may cancel out reductions in the costs of sickness, but for analytical purposes it is valuable to distinguish between the two. We, therefore, measure the costs of disease in the assumed absence of costs of unemployment, recognizing, however, that unemployment itself may have an impact on the incidence of illness (44).

There is another assumption implicit in the view that loss in production due to death, disability, and debility can be attributed to a particular disease. This is that the persons who die from or are disabled by the disease would otherwise be in good health. Here again, it is possible that persons saved from one disease may promptly die of another, and their production thus be lost in any case. It seems reasonable enough to disregard this possibility for clearly defined diseases that strike primarily at persons of working age; but it is less reasonable for cases where the disease, or treatment required to overcome it, weakens the patient by making him more prone to other ailments, and for cases when the disease strikes mainly at persons who are constitutionally weak in any case, as with the diseases of old age. In these cases, the loss in production can less clearly be identified with the effects of one disease. The result of disregarding the presence of multiple diseases is an overestimate of the cost of any single disease. At some later stage in refinement of the concept of disease cost, a methodology must be developed to deal with this problem.

Moreover, the assumption that side effects of other diseases may be disregarded in order to measure the direct effects of the disease in question means that the indirect costs of each disease, taken individually, cannot be added together to make a meaningful total for all diseases. Conceptually, such a summation could be made only if all alternatives to every disease were eliminated, in which case there would be nothing to sum. This problem illustrates the difficulty in applying the concept of resource-loss, as we are describing it here, to sickness as a whole.

The time scale of any estimate of resource-loss due to sickness involves further problems. Conceptually, it is possible to view the loss in production as (a) the loss in a given time period (for example, 1 year), (b) the loss over a productive work life.

The first of these seems most relevant to the present discussion because it is most nearly comparable to the types of estimates of resource-use and resource-transfer described earlier. It should be recognized, however, that death and permanent disability this year have a continu-

ing cost in terms of productive resources lost in the years that follow. Cost studies by Weisbrod (cancer, poliomyelitis, and tuberculosis), Malzburg (mental illness), Reynolds (road accidents) and Laitin (cancer) relate their estimates to the second of these concepts, the loss over a productive work life (45-48); the Fein study on the cost of mental illness developed 1-year estimates as well (3). The emphasis upon the lifetime estimate is perhaps due to the far-reaching influence of Dublin and Lotka's "Money Value of a Man," which presented an actuarial approach to this problem; but the authors of this work recognized that their method might not be applicable to the economy as a whole; it was intended originally to value a life for indemnity purposes only (49).

The 1-year estimate is conceptually much simpler, involves fewer assumptions, and in addition yields the most conservative estimate of resource-loss; for these reasons, we feel it to be the most appropriate measure in this context. The difference in estimates derived by these alternative approaches will not be so great as might appear at first, because (a) the appropriate disability figure in the case of a single-period estimate is that of disease prevalence, whereas in the case of a lifetime estimate it must be disease incidence, and (b) a rapidly diminishing value is attributed to future output in the process of placing a present value on these future earnings. Different interest rates assumed will affect the rapidity of the decrease as illustrated by the Weisbrod study which used alternatively interest rates of 4 and 10 percent—these being based respectively on the cost of long-term Government borrowing and the rate of return on corporate taxes (45). Conceptually the two types of estimates—for a single year and over a lifespan—must be regarded, however, as distinctly different.

There has been suggested earlier a threefold classification of resource-loss: losses from death, disability, and debility. In practice, these categories need closer definition, and it may be necessary to subdivide them further to make them correspond to available data.

Death is unambiguous in meaning, but cause of death is sometimes not. In estimates of resource-loss caused by a particular disease, deaths from multiple causes may need to be treated

differently from those caused by the disease in question alone. Disability caused by sickness may be partial or total, and it may be short term or long term. Cases of long-term disability, especially when total, may be found primarily in institutions, and thus it may be convenient to subclassify again into institutional and noninstitutional populations and use data available on institutional cases to measure a part of the disability caseload. The division between disability and debility, furthermore, will not be clearcut in many cases.

Loss of Working Time

The loss in resources through death, disability, and debility must, for the first stage of the estimate, be stated in terms of units of productive work time lost. The second stage to be dealt with later is to assign a value to these units. In the case of death and long-term disability, these units of work time are lost because of subtractions from the productive work force. With short-term disability, the loss will take the form of periods of lost time from the job and these may be converted into equivalent units of full-time work lost. Debility, defined as reduced productive efficiency per man, too may be converted into full-time equivalents. For convenience, the following discussion will refer to man-years as the units of productive work time.

How the equivalent of the full-time work force is defined operatively is of central importance to the estimate. For purposes of a single-year estimate, for example, a decision must be made on the age limits within which persons who contract disease will be considered as productive workers. In the United States, the age of entry into the work force is usually considered as 14 years. This starting age is largely a historical carryover in definition which has been perpetuated for comparative purposes in spite of the trend toward later entry into the work force. The retirement age varies widely among different groups and in different areas; the average age of retirement for the United States is estimated at present at 68 years of age for men (50).

The consequence of this limitation of work-force participation, for a single-period esti-

mate, is to count the resource-loss from death, disability, and debility of the young and retired aged as zero. This is consistent with the definition, since persons outside the work force are not considered to contribute anything to production in the year in question. For the extended time-scale analysis, however, infant and childhood deaths represent a future loss to society and must be allowed for, although the time interval between death and anticipated entry into the work force may be such that the present value of the future loss of working time is small.

The importance of the retirement-age assumption will vary with different social and economic settings. In some economies, the urgency of production for survival leaves little room for retirement prior to death or total disability; with higher productivity and industrial advances, cessation of work activity becomes feasible before extreme old age is reached. In an industrial community, therefore, it seems reasonable to exclude retired persons who cease to contribute to production, but in others retirement may be disregarded.

Whatever age limitations are set upon the productive work force, further qualification is necessary because not all persons of productive age are actually engaged in production. At full employment, only a certain proportion of the members of each age group will be productively employed, and the loss in man-years attributable to these persons alone should be counted toward the estimate of resource-loss. Here again, this implies that the death or disability of a person not in the active work force occasions no loss of productive resources.

Special problems arise in the case of women working in the home. Such women are not normally included in standard definitions of the work force, and their product, unlike that of paid domestic workers, is not included in the national economic accounts. Thus defined, their death or disability is not an economic cost. However, this is clearly highly anomalous; it implies that the national product is increased if every wife does housework for pay for the family next door, and lowered if every man marries his cook. The only alternative is to impute some value to the services of housewives in the home, thus imputing an indirect cost to their

death or disability. Although proposals have been advanced for broadening the concept of production used for national product purposes to include such nonmarket services, no generally agreed way to do so at present exists (51). To simplify the estimate and to follow an approach consistent with national product accounting it seems desirable at this stage of analysis to omit the valuation of housewife services.

A related problem concerns the method of counting deaths and disabilities among unpaid family workers. In the United States and several other countries, unpaid family work is included in the national product accounts, in effect requiring a prorating of income among the working members of the family enterprise. In this case, there is a basis for allocating a value to the services of such a worker. The importance of this problem obviously varies in different social settings, but in countries where a large proportion of production is carried on on farms and in other family enterprises it would be clearly advisable to count deaths and disabilities among those who work within the family unit without money wages.

In estimates over a lifespan, work life tables developed by the Bureau of Labor Statistics may be applied which identify the remaining years of work life at each age group. Estimates of work life years have been developed for 1940 and 1950 for both men and women; and historical changes in the pattern of work life expectancies have been estimated for 1900 and projected to the year 2000 (52-54).

Further problems arise in connection with part-time workers. The loss of productive work time for a given impact of disease among these persons will be less than that among full-time workers, and this loss will have to be converted to a full-time equivalent for purposes of the estimate. The effect will be to consider the loss of, say, two part-time workers as being equivalent to that of one full-time worker; the exact ratio might be determined with reference to average hours of work or other available criteria.

The most practical solution to these definitional problems may be to use existing concepts of "work force" and "labor force" (converted to full-time equivalents) to distinguish the cases of the disease that result in actual loss of pro-

ductive work time. In the United States, the basis for classifying persons in or out of the "labor force" is their activity during a specified week. Employed members of the labor force comprise those at work for pay or profit during the survey week, those who worked without pay for more than 15 hours on farms or in family businesses, and those who would have been in these two categories in the work force but for vacation, temporary illness, bad weather, or industrial disputes. Unemployed members of the labor force comprise all those without work who were actively seeking work during the survey week. Data will often be available only within this framework, and this method has the further advantage that it makes the estimate of resource-loss comparable in scope with existing national product estimates. The effect, however, is to exclude almost all the nonmarket costs of death, disability, and debility from our estimate of resource-loss, and this should be clearly recognized as a serious source of understatement of the total.

Our measure of resource-loss is posited on the assumption of full employment. However, it may be felt desirable to make an allowance for frictional unemployment, that is, the essential unemployment that exists even at full-employment levels as when persons change jobs or are temporarily laid off. In the United States, this is usually considered to run at about 3 percent of the labor force at any time; thus 3 percent fewer deaths and disabilities than the total of those from the labor force actually affect production at any time. It is also desirable to allow for absenteeism over-employment, which is normal absenteeism of workers from jobs because of vacations, bad weather, and temporary sickness. These adjustments may be applied to the final estimate of productive work time lost due to the disease as a straight percentage reduction, or in terms of a full-time equivalent number of man-years.

It is apparent even from this brief discussion of the problems of defining lost work time due to disease that many of the factors involved are dynamic. The single-period type of estimate, which sets out to quantify the gain in work time in a given year that would result if a specific disease were eliminated, avoids the problems of estimating future trends in work-force partici-

pation. For the lifespan type of estimate, these problems could only be solved by making a large number of assumptions about the future course of such trends, and the uncertainty and complexity of the estimate would be greatly increased.

Loss of Output

The previous stage in the computation has resulted in an estimate of the productive man-years lost because of deaths, disability, and debility from sickness. This, in itself, may prove a useful piece of political arithmetic, but in most cases it will be desirable to translate this into dollar cost by assigning a value to the man-years foregone in terms of lost production.

In the available studies on losses from illness, two essentially divergent approaches have been used in assigning a value to each unit of labor work time. The first is to value each unit by an amount equivalent to total product per worker; the other is to use earnings as a measure of labor product per worker.

The first of these assumes, as Fein (3) has indicated, "... that all of the national product (income), and therefore any gains in national product, are attributable to labor rather than to some combination of joint factors of production, land, labor, capital, etc. Although it may, indeed, be true that if there were no labor there would be no product, it is equally true that if there were no capital there would be very little product."

The total-product-per-worker approach was used by Reynolds in his study of the cost of road accidents in Great Britain (47) and also in the National Planning Association study on the costs of tuberculosis in the United States (55).

The second alternative—to use earnings as a measure of the output attributable to labor—seems to us to be more appropriate for purposes of estimating resource-loss. Earnings, in this case, must be distinguished from income, which includes returns on property or capital; earnings consist only of wages and salaries (or equivalents for the self-employed). These wages and salaries are paid in direct return for productive services, and, according to economic theory, they correspond to the individual's contribution to production. The estimate of re-

source-loss put in these terms thus measures the loss of production attributable to labor which this earnings-loss represents.

A choice between these two alternatives arises also in estimates of the costs of unemployment, which are perhaps more familiar than those of the costs of disease. Here, however, gross product per worker seems the more appropriate concept, because it is fair to assume in these circumstances that some capital will be unemployed along with labor. This brings to light another assumption implicit in our concept of resource-loss from a disease: this is that the ratio of investment of capital to labor used remains approximately constant. If this were not so (as, for example, if the investment or capital stock were assumed to be constant and unchanging), the labor released by eliminating the disease might have to work with less capital per capita, and diminishing marginal returns to labor would ensue. A related implicit assumption is that the capital stock is infinitely divisible, so that there is no question of the product of each man being tied to the availability of a machine or implement.

The earnings figure used may be an average for all employed workers. This assumes that the average earnings pattern among those who contract the disease is the same as that of the working population at large. For greater accuracy, it would be preferable to use a series of averages applied to sex-age groups, occupational categories, or other subdivisions and to take account of the findings of studies relating earning levels and disease incidence.

The use of average earnings per full-time employed worker is in fact only an approximation of marginal earnings, which are needed to actually measure the additional labor product that would become available as a result of eliminating the disease. Under the assumptions of full employment of labor and constant labor-capital ratio that we have made, average and marginal earnings will be the same. In practice, however, if elimination of the disease were to throw a relatively large number of workers onto the labor market, it might be found that these assumptions would need to be relaxed for purposes of realistic prediction.

A word must be added about an argument

appearing sometimes in the literature (49) that a man's contribution to production should be considered net, exclusive of the essential consumption required to maintain him as a producer, rather than gross as we have taken it here. Quite apart from the virtually insoluble difficulty of defining "essential" consumption, the frame of reference of our problem is to determine the loss in total output caused by disease and thus by definition the gross approach is indicated. The fact that saving a life adds a consumer as well as a producer to the economic process is immaterial to an estimate of change in total output. Calculation of the resulting change in consumption levels per capita is basically a problem of resource-use rather than losses in production.

Average earnings multiplied by the number of man-years lost as a result of the disease yields the dollar estimate of resource-loss caused by a disease. We are now in a position to define the result more closely. It is, essentially, an estimate of the money value of the labor product lost as a result of death, disability, and debility due to a disease.

Gaps in Statistical Data

The foregoing summary of concepts and definitions in the measurement of output-loss due to a disease suggests the wide range of assumptions and approximations which must sometimes take the place of factual information in estimating the dollar amounts.

Statistics on employment patterns are applied to data on deaths by cause, age, and sex without taking account of the specific employment history of those who die. The assumption of average work-force participation is made necessary by the absence of specific information on employment status of the deceased. In fact, there will be differences in the importance to productivity of each death: elimination of a key worker in a basic industry, for example, might affect the ultimate output of hundreds of others.

Estimates of average full-time earnings are applied to deaths in the productive age groups without taking into account the differential death rates in different industries and occupations, which may pay different wages. The absence of recent data on deaths by occupa-

tional groups and by earnings classes necessitate the use of average figures.

Improvement of the estimates now in current use of the resource-loss due to deaths not only requires agreement on concepts and definitions for measurement, but also additional data on mortality by cause of death, relation of the deceased to the work force in a period preceding death, and occupation and earnings in a period prior to death.

Data on work-loss days for those attached to the work force have become available through the U.S. National Health Survey of the Public Health Service. These data, however, are published only for the following groups of conditions: infectious and parasitic, circulatory, respiratory, digestive, genitourinary, arthritic and rheumatic, injury and impairment due to injuries, other impairments, and all other conditions. Until such data become available for more specific disease categories, information on disease prevalence and on duration of illness will be combined with average work-force participation for age and sex groups to approximate the work-loss days. Moreover, data are needed on usual earnings rates received by persons reporting work loss due to a condition. The existence of multiple conditions yields an inflated count of work loss attributable to each condition and an overcount of the sum of days for more than one condition.

The impact of diseases which cause debility, or loss of working efficiency, is no simple matter to define. In its broadest dimension, a measure of loss of output due to disease debility requires formulation of a standard of output in the absence of the disease, from which shortcomings may be measured. Additional work is required on the concept of measurement, as well as on the collection of data permitting a count of lost product per unit of work time. In highly industrialized countries, machines have taken over much of the physical work of man, and maximum demands are seldom made upon the physical energy of the average worker in the mechanized industries. What, however, are the appropriate counts of maximum output in terms of human capacity in service and nonmechanized employment and of deviations from these maximums? In other economic settings, the energy capacity of a man at work may be of

great importance. In subsistence agriculture, reduction in debility from malaria, trachoma, or dysentery can be as important a factor in increasing productivity as a change in tools or technology.

Debility, where relevant, thus represents the least well defined of the three categories through which we examine the resource-loss from disease. However, its influence is so pervasive that some basis for estimating its impact on the economy is badly needed.

Conclusions

To summarize, the economic costs of disease and injury are of three types: (a) costs which use a share of the Nation's resources of manpower and materials to supply health services and their commodity components; (b) costs represented by the transfer of income and resources from the well to the sick in public and private efforts to mitigate the burdens of illness; (c) costs reflected in a reduced national production of all goods and services. These three types of costs are termed resource-use, resource-transfer, and resource-loss.

The price of control of a disease is the health resources used up in the treatment and control of a disease. In economies characterized by severely limited resources and low food supplies, there must be added the minimum essential consumption of people whose lives are saved by the successful disease control action.

The economic cost of a disease for price-cost comparisons is the loss in labor product, or the amount by which the national output in a year is reduced by death, disability, and debility.

The omissions and limitations of this type of economic arithmetic are many. The scheme fails to take into account the pervasive force for social and economic change released by improvement in mortality rates and changes in expectations of survival. Changes in life expectancy and in health status radically alter attitudes toward work and enterprise. Disease and early death are deeply implanted in the mores of many people of the world. The fears, superstitions, rigid social patterns, and resistance to change are in part cultural adjustments to high disease and death rates. While they are not to be changed overnight, one cause of

them will be removed when illness is limited and death rates sharply reduced.

Changes in expectation of life, moreover, alter individual attitudes toward sacrifice of some part of today's consumption for tomorrow's. The time perspective of planning and investment for economic development is deeply affected by health levels. A prospect of longer life disposes the individual to support long-run development projects because he sees for himself a better chance of reaping some of their benefits. Changes in life expectancy, especially of infants and children, offer some promise of adjustment, over a period of time, in size of family, fertility rates, and age structure of the population.

The accounting of economic gains and losses as described also omits what is perhaps the simplest and most direct economic effect of all. Health is itself an element in the standard of living. Concentration on health as an investment in economic resources—an intermediate product of value in that it helps to increase national output—must not obscure its parallel importance as a final product for human welfare.

Objection on ethical grounds has sometimes been raised to conversion of human lives to money terms, to the disregarding of human suffering and to the counting of saved lives of children and other nonproducers as a price rather than gain. The value of human life and relief of suffering obviously cannot be disregarded in health programing. Disease prevention and control measures which yield zero or even negative economic returns can be fully justified in terms of human values. The fact that the economic arithmetic of a disease is only one of a number of tools for evaluation of health programs does not in itself argue against development of cost estimates of disease.

Voluntary and public agencies concerned with specific diseases have developed or used such estimates to further programs of medical research and disease control. They have financed studies of these costs to give them a tool to describe the size of the problem in public discussion. Review of these studies indicates clearly the need for development of a conceptual framework for such estimates, for a clearer formulation of their assumptions and limita-

tions, and for indication of the areas in which relevant data still need to be collected.

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ADVANCES IN PATHOLOGY

CONFERENCE REPORT

THE TRANSPLANT of human leprosy into animals, a new technique to detect cancer cells, a reevaluation of Buerger's disease, and an explanation of some causes of sudden death were announced at the annual meetings of the International Academy of Pathology and the American Association of Pathologists and Bacteriologists held April 20-25, 1959, in Boston, Mass.

Transplant of Human Leprosy

Experiments that appear to have achieved the long-sought goal of transplanting human leprosy into animals were reported by Dr. Chapman H. Binford, Public Health Service officer on duty with the Armed Forces Institute of Pathology, Washington, D.C.

In the experiments bacilli from skin specimens of leprosy patients were inoculated into 2 sets of 50 golden hamsters each, Dr. Binford said. Infections paralleling those of human leprosy in tissue pattern, number of bacteria within cells, and presence of bacteria within nerves appeared in the hamsters in the 18 months following inoculation.

Bacilli from these animals were then injected into a second group of hamsters, and in 5 months an infection that resembled leprosy again appeared. Bacilli from that group have been transferred to a third set of hamsters with apparently successful results.

The golden hamsters were inoculated in their ears and testes. The temperatures of these sites are lower than those of other regions of the body, and the micro-organism *Mycobacterium leprae* in man is known to prefer low-temperature regions.

One group of hamsters in each experiment was given injections of heat-killed bacilli as a control measure. None developed infections. During the 3-year investigation, 35 different inoculation experiments were tried in more than 1,500 small animals. Inoculation was unsuccessful in guinea pigs, albino hamsters, white rats, white mice, hairless mice, and monkeys.

The research was a joint effort by the Laboratory Branch, Communicable Disease Center, Public Health Service, at Chamblee, Ga., the Armed Forces Institute of Pathology, and the Leprosy Registry, American Registry of Pathology, of Washington, D.C.

Dr. Binford emphasized that the results of the experiments must be viewed with caution and confirmed by repetition. He hopes that other researchers will try to reproduce his results.

During the 85 years since Dr. Gerhard Hansen discovered the leprosy bacillus, claims of successful culture of the bacteria in laboratories and production of the disease in animals have been made and later disproved. Verification of results is difficult because there is no laboratory method for positively identifying the bacillus.

Inability to grow *M. leprae* on artificial media or to infect laboratory animals has hindered research on leprosy. If stable, regularly reproducible lesions due to the leprosy bacillus are acceptably established in the hamster or other animals, many objective studies of leprosy can be undertaken in research laboratories. Among these would be search for more effective treatment, experiments in transmission, exploration of immunological processes, and renewed investigations in bacteriology.

Cancer Cell Detection

By employing a fluorescent orange dye, pathologists at Walter Reed Army Hospital have halved the time required to detect cancer cells in smears taken in cytology examinations, stated Capt. Leroy H. Dart, pathology resident, and M. Sgt. Thomas R. Turner, cyto-technologist. They said that 5,491 microscopic preparations stained with the new dye, acridine orange, were examined twice as rapidly and just as accurately as with the Papanicolaou technique.

The technique they reported represents a modification of the acridine orange method introduced by Ludwig von Bertalanffy.

The dye causes nucleic acids present in the cells to give off a green and red fluorescence. Cancerous cells, which contain increased amounts of nucleic acids, show an extremely bright fluorescence under the microscope.

Captain Dart pointed out that the method is used only as a screening examination. When the possible presence of cancer is indicated, final diagnosis is made by microscopic examination of a biopsy specimen. The laboratory service of Walter Reed Army Hospital has adopted the fluorescent dye technique for routine examination of smears.

Buerger's Disease

Buerger's disease may not be a disease entity at all in the opinion of a group of medical investigators associated with Beth Israel Hospital and Harvard Medical School.

The researchers were Dr. Stanford Wessler, associate in medical research at the hospital

and assistant professor of medicine at Harvard; Dr. Si-Chun Ming, senior fellow in pathology at the hospital and clinical associate in pathology at Harvard; Dr. Victor Gurewich, former resident in medicine at the hospital, and Dr. David G. Freiman, pathologist-in-chief and director of laboratories of the hospital and clinical professor of pathology at Harvard.

They suggested that what was once diagnosed as Buerger's disease and resulted in blockage of the arteries in the extremities of the body is due to the formation of blood clots in the arteries and veins or to atherosclerosis. They compared 123 new patients with a diagnosis of Buerger's disease with 1,365 new patients with other forms of arterial disease admitted to Beth Israel Hospital from 1929 through 1956.

The number of diagnoses of Buerger's disease steadily declined, and none was made after 1950. "This suggests increasing reluctance on the part of physicians to make the diagnosis on clinical grounds alone," the researchers stated.

Historically Buerger's disease stems from a pathological description in 1908 by a New York physician, Dr. Leo Buerger. Impressed by the occurrence of gangrene in a small number of young men, he described certain characteristic clinical and pathological features which, he believed, distinguished the vascular disease in these patients from that found in the majority of persons disabled by peripheral arterial obstructions.

During the next 50 years various aspects of this disease were described in several hundreds of articles from all parts of the world, the investigators noted.

Thromboangiitis obliterans has been described as a specific, idiopathic, recurrent, segmental, inflammatory, obliterative vascular disease involving the medium-sized arteries and veins of the extremities and only rarely the visceral vessels.

The researchers concluded that the term Buerger's disease had best be avoided until more convincing evidence of its existence is presented.

Conduction Tissue

Damage to the vital tissue that conducts the electrical impulse which stimulates the muscle

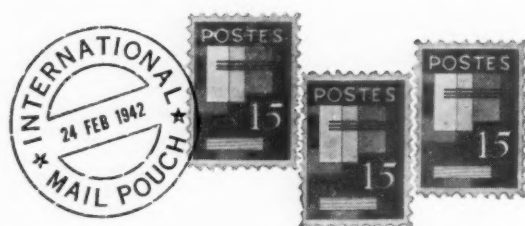
of the two lower chambers of the heart to contract may offer an explanation of some causes of sudden death, according to Dr. George Lumb, Dr. R. S. Shacklett, and Dr. Luther B. Otken, Jr., staff members of the University of Tennessee medical units.

Pathologists are not agreed on whether this vital tissue is composed of nerve or muscle cells, but its importance in the maintenance of life is unquestioned.

The researchers studied the hearts of 260 persons to investigate the diseases which can affect the conduction tissue and produce death

or incapacity of the patient. In a number of instances, the patient died suddenly without significant autopsy findings other than damage to the conduction tissue to explain the suddenness of death.

Pathological lesions found included hardening of the coronary arteries so that there was an inadequate supply of blood to this tissue, inflammation or abscess, hemorrhage or degenerative lesions. The physicians believe that these lesions are perhaps of sufficient magnitude to explain the sudden death of some patients.



The Interns and the Epidemic

When news of 35 deaths and more than 300 people ill in the Dembia Plain came to the Public Health College and Training Center at Gondar, Ethiopia, the college's resources and its first group of interns were mobilized. The symptoms—headache, cough, bloody sputum, muscle pain, and upper respiratory infection—and the investigations of health officers indicated that the outbreak was influenza.

Within 24 hours senior students and graduates were organized into 6 teams, with an intern and 2 senior health officer students on each team. Three teams were assigned to the east side of the Dembia Plain, three to the west side.

The teams traveled from village to village. At each they went first to the chief to explain their mission and to find out how many people had died recently, how many were sick, how long they had been sick, and how many lived in the village. They asked the chief to choose a place where they could see ambulatory patients and they visited the seriously ill. As they saw patients, one man diagnosed, one administered treatment, and one kept records.

The people welcomed the teams because they remembered the malaria epidemic of 7 years ago and feared this sickness was the same disease. But fear and over eagerness sometimes hampered the teams.

Villagers who were well wanted medicine to keep from getting sick. Others wanted only injected medicine. Sometimes faith in medicine was so great that a man adopted the symptoms of the preceding patient. One man asked, "Why do you inject me in the buttock when it's my head that hurts?"

The interns patiently explained that cleanliness and isolation, not medicine, prevented this disease; that medicine was not good for those who were not sick; that different diseases require different medicines; and that an injection is not a cure-all. Often the chiefs as well as the people thought that everyone should be treated.

In the villages, the teams were closely watched. They were asked why they washed their faces in the morning and why they boiled milk, and they were accused of taking the medicine themselves to keep from being sick.

But people wanted them to stay, and often when it was time for a team to depart, there were no mules they could use to continue their journey. Only a stern reminder that the local governors had ordered the villagers to supply them would produce the mules.

The interns also learned to be wary of reports of sickness. Messengers exaggerated the number of the sick to get a team to come to a village. After walking 20 kilometers to find only 1 or 2 patients instead of the 20 or 40 reported, the students learned to make sure a report was verified by a chief.

When the interns had done as much as they could, the teams were recalled to Gondar. They had traveled 1,071 kilometers, visited 57 villages, and treated 2,732 patients.

—ARTHUR C. CURTIS, M.D., *former chief, Health and Sanitation Division, U.S. Operations Mission, Ethiopia.*

Remunerative homework was found feasible for chronically ill, homebound patients during 2½ years of experience with a group generally considered too incapacitated for vocational activities.

Jobs for the Homebound

MARGARET CLARKE, M.A.

JOBS FOR THE HOMEBOUND is a 5-year demonstration project in vocational rehabilitation operated by the home care department of Montefiore Hospital in New York City. The project is a direct outgrowth of the department's 11 years of experience in providing comprehensive medical care at home to chronically ill, medically indigent patients.

The home care department provides treatment for 85 to 95 patients in the Bronx and upper Manhattan. The patients' illnesses are of such severity that they are unable to attend outpatient clinics and can be maintained at home only with close medical supervision. Care is provided by a medical-social team composed of physicians, social workers, nurses, recreation and art therapists, and physical therapists.

Basic to the philosophy of the home care department is the belief that an indispensable component in medical treatment of the patient is helping him cope with the overwhelming emotional, social, and economic needs which arise with long-term illness. One of the most prevalent of these is the patient's need for meaningful activities appropriate to his physi-

cal condition. Without such activity the patient becomes apathetic and withdrawn, and he may suffer both medically and psychologically.

From the inception of home care, services included a program of diversional activities, and this provided satisfactory occupation for the majority of patients. However, some patients seemed unable to derive satisfaction from leisure-time activities, and from them came a small but very steady stream of requests for "real work." Unfortunately, the community had no facilities for the vocational rehabilitation of homebound patients who were as sick as those found in home care. A survey of rehabilitation facilities for homebound patients in other parts of the country showed that the type of patient seen in home care was consistently excluded from vocational rehabilitation services.

It was decided that the home care patients' persistent requests for work could not be ignored and that investigation of the possibility of their engaging in economically productive activity was warranted. The jobs for the homebound project was initiated on March 1, 1956. The investigation was supported, in part, by a demonstration special project grant from the Office of Vocational Rehabilitation, Department of Health, Education, and Welfare. The New York Chapter of the Arthritis and Rheumatism

Miss Clarke is co-director, with George M. Warner, M.D., home care executive, of the jobs for the homebound project, department of home care, Montefiore Hospital, New York City.

Foundation, the New York Heart Association, and the Nathan Hofheimer Foundation also provided grants for the project.

Objectives

The objectives of jobs for the homebound are:

- To demonstrate the possibilities in vocational rehabilitation for homebound, handicapped individuals with low productive capacities, exploring the potential of such persons for vocational rehabilitation and studying the individual and social effects of vocational rehabilitation on such persons.

- To develop methods for and to determine the cost of providing vocational rehabilitation services to this type of patient.

- Through the information thus obtained, to encourage and facilitate the provision of vocational rehabilitation services to homebound persons presently not considered eligible for these services.

Methods and Organization

Jobs for the homebound functions as an integral part of the home care department, adding vocational rehabilitation to the treatment program of patients for whom this service is indicated. The project began in response to persistent requests from some patients, estimated originally at 30 percent of the total number receiving home care. The idea of working does not occur to many home care patients; generally they are seriously ill persons whose medical conditions are irreversible. Each home care patient who expresses a desire to work and for whom the staff believes work would be beneficial is admitted to the project.

Following admission, the patients are carefully evaluated. Medical evaluations are based on a patient's medical history, results of current physical examination, diagnosis, and an analysis of physical capacities. The psychological and social evaluations include the results of the thematic apperception test and sentence completion test covering attitudes toward illness, a guided interview of work history with emphasis on the meaning of work to the patient, a social data questionnaire, a housing evaluation, and an analysis of patient-family relationships. The

scores and observations on intelligence, interest, skill, and aptitude tests and the education, work experience, and interests revealed in the vocational counseling record are considered in the vocational evaluation of the patient. The project staff then attempts to develop appropriate work plans for the patient.

Patients who in the course of the evaluations, or later, proved to lack ability or incentive to work are carried as inactive participants on the project. This procedure is followed so that the characteristics of the inactive participants can be compared with those of patients who accepted work, and the proportion of the potential candidates for work who subsequently proved unsuitable for work can be ascertained.

Detailed records of work activities are maintained. The patients' reactions to work are continuously observed by home care and project staff members. Medical, psychological, and social effects of work on the patient are formally evaluated yearly.

The co-directors of jobs for the homebound are the home care executive, who is a physician, and the home care supervisor of recreation and art therapy. The professional staff is composed of a vocational rehabilitation specialist and a design specialist. A clinical psychologist, a sociologist, an internist, and a statistician are consultants to the project. The nonprofessional staff consists of a secretary and an assistant workshop foreman who handles stock, pickup, and delivery.

An advisory committee of community leaders in business, industry, and philanthropy who are members of the Montefiore Hospital Board of Directors provides overall guidance for the project and specific assistance in matters pertaining to business and industry.

Characteristics of Patients

Of the 194 patients admitted to home care during a 2½-year period from March 1956 to September 1958, 73 were considered for the project, 34, or 17.5 percent, were admitted, and 39, or 20.1 percent, of those suggested were not admitted (table 1).

Patients were discharged from the project when discharged from home care. Of the 34 patients admitted, 10 were hospitalized during participation and were readmitted to the proj-

Table 1. Reasons by frequency for not admitting 39 home care patients to the project, October 1956–September 1958

Reasons ¹	Number of patients	Percent	Reasons ¹	Number of patients	Percent
Staff opinion-----	39	65.0	Staff opinion—Continued		
Physical basis-----	21	35.0	Psychological basis—Continued		
Insufficient physical capacity-----	7	-----	Insufficient mental capacity for work due to brain damage-----	2	-----
New home care patient; staff wanted to observe performance in recreational activity before exposing to work-----	7	-----	Patient would be unduly upset should he have difficulty in performing work assigned-----	1	-----
Patient extremely disabled and not capable of performing work currently or potentially available; admission held until promising work found or devised-----	3	-----	Recreational therapy appeared to fill patient's occupational needs-----	1	-----
Patient needed physical therapy or training in activities of daily living or both before work activity-----	2	-----	Patient refusal-----	13	21.7
Patient physically able to work outside the home-----	2	-----	Felt himself to be too ill or disabled-----	3	-----
Psychological basis-----	18	30.0	Not interested in type of work available-----	1	-----
Patient insufficiently motivated-----	4	-----	Did not want to be tied to a work schedule-----	1	-----
Patient would resent the simple type of work which he was capable of performing-----	4	-----	Did not want to return a portion of earnings to department of welfare-----	1	-----
Patient currently too absorbed in medical or personal problems to concentrate on work-----	3	-----	Would consider only return to former employment-----	1	-----
Independent activities and interests appeared to satisfy patient's occupational needs-----	3	-----	Did not feel he needed money-----	1	-----
			No reason given-----	5	-----
			Other-----	8	13.3
			No worker to carry patient due to temporary staff vacancy-----	4	-----
			Patient to be discharged from home care in near future-----	3	-----
			Patient died after referral and before admission-----	1	-----
			Total-----	¹ 60	100

¹ Average number of reasons for not admitting patients: 1.5.

ect when readmitted to home care, and 12 were permanently discharged. Seven died, four improved sufficiently to attend outpatient clinics, and one was discharged because he could afford to pay for private medical care.

Of those admitted, 19, or 55.9 percent, were women and 15, or 44.1 percent, were men. (Fifty-seven percent of the patients admitted to home care during the 2½-year period were women.) The median age of the patients was 51.5 years. More than half, 19, were married, 8 were widowed, 1 was divorced, and 6 were single.

Heart disease was by far the most prevalent diagnostic category among patients. Fifteen, or 44.1 percent, of the patients had heart disorders; nine of these had rheumatic heart disease. The others according to diagnostic

categories included pulmonary diseases, four; arthritis, four; diseases of the circulatory system, three; and metabolic diseases, three. The remaining categories with one patient in each were allergies, diseases of the muscular skeletal system, diseases of the central nervous system, cancer, and neurosis.

Three-fourths of the patients had from one to six complicating conditions in addition to the primary diagnosis. Although a few patients were able to leave their homes for short periods daily, the majority were totally home-bound. Eighteen were ambulatory in their homes, 10 ambulated with difficulty, 4 were wheelchair-bound, and 2 were bed-bound; 27 had relatively good use of their hands and, 7 had moderately or severely limited use.

The patient's physician did not recommend

Table 2. Patient performance of industrial homework contracts,¹ October 1956–September 1958

Product and operations	Skills required	Median number hours worked per patient per day	Total earnings per week per patient		Subsidy per week per patient	
			Range	Median	Number patients subsidized ²	Percent total earnings subsidized (median)
Bag seals: hand assembling of three components, bulk packaging.	Moderate finger and manual dexterity.	2	\$4. 60–12. 60	\$6. 95	6 (6)	33
Plastic key chain puzzle: hand assembling of six components, unit packaging.	Moderate degree of finger and manual dexterity.	1½	\$2. 80–4	\$3. 40	2 (4)	28
Christmas tags: counting assorted tags, inserting in cellophane bags, heat sealing, packing bags in display cartons.	Moderate gross dexterity	2	\$2. 60–9. 30	\$5. 60	4 (7)	50
Metal souvenir party favor: gluing decoration on metal can opener, unit wrapping, and packaging.	Moderate degree of finger and manual dexterity.	1¾	\$10	\$10	0 (1)	0
Hospital linens: machine sewing, seaming, hemming, counting, folding.	Moderate degree of finger and manual dexterity; experience with sewing machine.	1½	\$2–9. 60	\$4. 90	5 (6)	34
Handkerchiefs: hand folding, assorting, pinning, carding in units.	Moderate degree of finger dexterity, unimpaired vision.	2	\$4. 40–11	\$7. 20	3 (6)	18
Display card: stringing plastic cord through 8 holes on card, bulk packaging.	Slight degree of finger and manual dexterity.	3	\$0. 52–19	\$8. 44	11(16)	30
Milan straw leaf decoration: straw laced around pattern, hand sewn, and shaped into millinery leaf.	Moderate to good degree of finger and manual dexterity; visual acuity.	1½	\$1. 20–15. 60	\$6. 25	4 (7)	62
Butter knife set: wrapping gift box, tying with bow.	Moderate degree of finger and manual dexterity.	2½	\$8	\$8	0 (1)	0

¹ For one contract, preparing a visual display, three patients worked on a sample only.

² Figures in parentheses indicate the number of patients engaged in each contract.

rigid restrictions on activity for the majority of patients with heart disease or for those in the other diagnostic categories. The patient was allowed to set his own limitations on the number of hours he could work and the movements he could make. This flexible approach was possible because the physician visited the patient frequently and was aware of the patient's work and of any impact it had on his medical condition. Also, the vocational worker, in close contact with the physician, could demonstrate any work being considered for a patient

and ascertain the physician's approval or disapproval.

The psychologist found that the patients' emotional attitudes were strongly influenced by their illnesses, and their attitudes toward illness were quite solidly fixed since they had been ill for months or years before admission to the project. The most prevalent emotional response to illness was depression. The most frequent bases for depression were absence of hope for cure, the feeling of being a drain on the family, and inability to continue activities,

**Table 2. Patient performance of industrial homework contracts,¹ October 1956–September 1958—
Continued**

Product and operations	Skills required	Median number hours worked per patient per day	Total earnings per week per patient		Subsidy per week per patient	
			Range	Median	Number patients subsidized ²	Percent total earnings subsidized (median)
Handkerchiefs: hand folding, counting, and unit boxing.	Normal finger and manual dexterity.	1½	\$3–5. 60	\$4. 30	2 (6)	45
Christmas cards: counting, and unit packaging.	Moderate gross dexterity.	3	\$2–4. 63	\$2. 30	3 (4)	36
Envelopes: addressing by hand from printed alphabetical file card.	Literacy; clear handwriting; moderate degree of finger dexterity.	3½	\$0. 40–22	\$8	4 (7)	12
Plastic hankings: folding, tying with rubber band, bulk packing.	Normal finger and manual dexterity.	2	\$2. 75	\$2. 75	0 (3)	0
Dressing packages: counting dressing components, unit wrapping, bulk packaging.	Normal finger and manual dexterity.	3	\$1. 60–8. 80	\$4. 50	8 (8)	40
Linked key chain and charm: assembling three component parts, bulk packaging.	Normal finger and manual dexterity.	2	\$4. 20–8. 53	\$6. 50	0 (8)	0
Plastic garment bags: hand folding, counting, bonding, unit wrapping, and packaging.	Moderate finger and manual dexterity.	4	\$4–22	\$12. 25	4 (5)	33
Closet accessory dress clips: counting, packaging in cellophane bags.	Slight to moderate gross dexterity.	1	\$3–5. 20	\$4. 40	1 (1)	65
Metal rings and tie clips: piercing and monogramming according to specifications.	High degree of finger and manual dexterity; jewelry experience.	1½	\$6	\$6	0 (1)	0
Cardboard washer disks: punch die-cut disks from cardboard insert tack, bulk packaging.	Normal to fine finger and manual dexterity.	3	\$8. 76–32. 88	\$14	2 (5)	42

such as work and homemaking, which were lifelong criteria of value and acceptability.

The sociologist's data showed that the majority of project participants were from the lower or working classes. Their educational backgrounds were limited, the average number of years of schooling being 8.9. Most had done semiskilled or unskilled work prior to illness, a few were former white collar workers, and none had followed professions. Their median annual earnings prior to illness were \$2,375.

More than one-third of the patients were

born outside the United States, 11 of these in Eastern Europe. Fourteen were Jewish, 6 Italian, 3 Negro, and the others were scattered throughout a number of ethnic and religious groups.

The composition of the group mirrored the ethnic and religious characteristics of the community served by Montefiore Hospital. In this area are predominantly Jewish neighborhoods, predominantly Italian neighborhoods, a few scattered pockets of Irish, and one large traditionally Jewish area increasingly populated

by Negroes and Puerto Ricans. In comparison with the United States population, there was a disproportionately high number of foreign born among the participants.

Work Activities

The most important and dramatic outcome of the project to date is the finding that there is available work which can be performed by patients generally considered to be too incapacitated to work. In a 1-year period 17 such patients put in 3,306 man-hours of productive work and earned from \$1.20 to \$32.88 per week.

There were two types of work for patients in the project: performance of simple industrial processes on jobs subcontracted from local industries; and individualized work activities for patients who were unsuited to industrial homework because of physical disability or because they had special talents and interests. Industrial homework was handled by the vocational rehabilitation specialist and individualized work plans by the design specialist.

Twenty-two patients engaged in work activity extensively, and 11 rejected work on all or the majority of occasions when it was offered. One patient had not yet been offered work because of recentness of admission.

All 22 patients who engaged in work activity worked on at least one industrial homework job. Work plans were also developed for 16 of them by the design specialist. Frequently the work plans originally developed for individual patients subsequently proved applicable to project patients generally.

Industrial Homework

Twenty industrial homework contracts were obtained in the 2½ years. Most of the work consisted of simple, nonskilled operations. Typical jobs included packaging of Christmas tags, assembly of key chains, and sorting and packaging of garment bags and hospital dressings (table 2).

More industrial homework was found than had been expected since a very small and limited "work force" could be offered to prospective employers. While it was not always possible to maintain a steady flow of suitable work



A patient with rheumatoid arthritis works in bed. She staples a display card, homework obtained through an industrial contract.

for all patients, there was always enough work for at least half the patients.

Industrial homework contracts were more readily obtainable from sheltered workshops in the community and from Montefiore Hospital than from industry. All except 4 of the 20 contracts obtained came indirectly from industry through a sheltered workshop or from Montefiore Hospital.

The majority of the contracts were of relatively short duration and involved small amounts of money. The median length of the contracts was 5.5 weeks; the median income per contract was \$23.10. More than half the contracts carried time and production quotas.

No equipment or materials other than those supplied by the manufacturer were necessary for the majority of the contracts. It was found impracticable to obtain or devise special equipment to compensate for a patient's disability; the expenditure of time and money which would

have been necessary were not justified for the short, low-paying contracts.

The ability and skill required of the workers were modest. Only two contracts required work with a high degree of finger dexterity and nearly half required only moderate finger and manual dexterity. Not all jobs were appropriate for all patients. The median number of patients for whom a contract was suitable was 5.5.

The production records of 17 patients who performed industrial homework for all or part of a 1-year period were analyzed. They worked a median of 10.25 hours per week or approximately 2 hours per day, and the number of hours was markedly influenced by the type of work performed. For example, one contract, inserting lacing through a display card, was so nontaxing that patients who customarily worked 2 to 3 hours a day worked at it for 6 to 8 hours.

In accordance with regulations of the U.S. Department of Labor, patients were paid at piece rates comparable to those paid nonhandicapped workers performing similar jobs. Patients who failed to earn an average of 40 cents an hour while working at piece rate were subsidized up to this amount, the subminimum rate approved for the project by the Department of Labor. The median earnings per patient were \$4.64 per week, and the median subsidy per patient was \$1.02 per week or 8 cents per hour. Approximately half of the patients consistently required fairly high subsidy; the other half, only small amounts of subsidy and only on occasional jobs.

Although all the patients were seriously ill, the range of capacity for economic productivity among them was considerable. At the top level was Mrs. A. T., 52, with rheumatic heart disease. During a typical 1-month period, she worked at several different industrial jobs for a total of 53 hours, earned \$27, and required no subsidy. On the lowest level was Mr. S. R., 41, with multiple sclerosis. In 1 month he worked a total of 20 hours, earned \$8, of which \$5.60 was subsidy.

The work performed for a sheltered workshop demonstrated the advantages in the sharing of contracts by workshops and homebound programs. The increase in the size of the "labor force" and the diversified skills made

available when workshop and homebound clients joined forces enabled the combined group to fulfill larger and more complex contracts than either could do alone.

The contracts with Montefiore Hospital for machine sewing of surgical supplies and packaging of cotton and gauze dressings demonstrated a work plan widely applicable for the disabled. This type of work is required by hospitals throughout the country and should, therefore, be available to sheltered workshops and homebound programs nationwide.

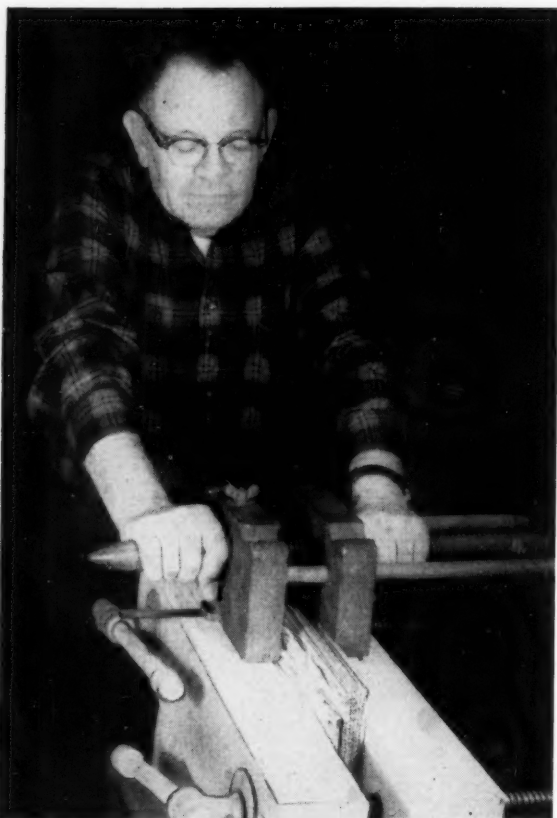
Individual Work Plans

Special work plans were developed by the design specialist for patients who found industrial processes difficult because of impairment of manual dexterity and for those who had special talents and skills and preferred more challenging activity than industrial homework.

In developing work plans for severely disabled patients, the design specialist geared her efforts to the problems presented by two women with rheumatoid arthritis. The movement of fingers, wrists, and arms was so drastically limited for these women that they represented the minimum manual ability in the group. It was assumed that any work plan that proved physically possible for them would be widely applicable among others who found industrial processes difficult.

The first work plan developed for the arthritis patients was based on the vocational background of the women concerned. Both had been sewing machine operators prior to illness and were anxious to resume this type of work. They were found able to handle straight machine sewing, their knowledge of the process being so firmly ingrained that they were able to adapt the process to their manual limitations.

The design specialist found that Montefiore Hospital manufactured for its own use glove covers, syringe covers, binders, and other surgical supplies which required simple machine sewing. The patients were tested on manufacture of these items and proved able to produce them satisfactorily. The project then contracted with the hospital to supply a portion of its requirements for surgical supplies. The job was transferred to the industrial homework



A patient with bronchial asthma binds medical journals. Formerly a skilled carpenter, he works at bookbinding approximately 4 hours a day.

category when it proved appropriate for five women in addition to the arthritis patients.

The second work plan initiated for severely disabled patients was the development of salable articles so designed that their production required only movements which these patients were able to make. Again the arthritis patients were the guinea pigs.

The first step in devising a product was to have the arthritis patients experiment with the process to make sure that they could carry out each of the required movements. A sample of the product was then made and submitted to the buyers of representative department stores and gift shops in New York City. Products were modified or discarded on the basis of the buyers' opinions. Products with which the design specialist experimented included block-printed and silk-screened napkins, place mats, greeting cards, hand-stenciled glasses and bottles, and ceramic tile ashtrays.

By September 1958 six patients were producing for sale machine-sewn tablecloths and ceramic ashtrays. These articles were being marketed through Free Will, a distribution agency sponsored by the New York State Division of Vocational Rehabilitation. Numerous other products were still in the experimental stage.

The design specialist developed four specialized work plans for patients who preferred more challenging work than the industrial jobs available on the project. One such patient was Mr. C. K., a former carpenter, with severe pulmonary emphysema. He had been enormously proud of his ability to design and construct fine furniture and was bored with and somewhat contemptuous of the nonskilled industrial homework. The design specialist helped this patient develop an original method of bookbinding at home. A sizable amount of work was obtained for him in the binding of professional journals for physicians in the hospital.

Another patient, a young man who had had diabetes for most of his life, was trained in jewelry making. For three women who were highly skilled in needlework a contract for sewing of a millinery decoration was obtained. Three women who did exceptionally fine knitting were helped to market their work through a specialty shop.

Impact of Work on Patients

By September 1958, 13 patients had completed a year or more of participation in the jobs for the homebound project. Eight accepted work on the majority of occasions when it was offered, and five consistently refused work.

The data on the impact of work on the eight patients who accepted work should be interpreted most cautiously. The material was obtained from both formal evaluation procedures and the informal observations which physicians, social workers, and others made in the course of routine contacts with the patients.

The strongest impact of work appeared to be psychological. Some degree of improvement was observed in all eight patients who worked for a year or more. The most frequently reported psychological effects were reduction of depression and increased feelings of adequacy.

Improvement was seen in the attitude of each of the eight patients toward his illness rather than in measurable clinical improvement. Changes included less preoccupation with limitations and relinquishment of unrealistic plans for the future. In only one instance did work appear to bear some relationship to a symptomatic change in the patient.

Work was reported to have had an impact on patient-family relationships of five patients who worked for a year or more; no impact in this area was reported from the other three. Though for all five, some improvement in family-patient relationships was reported, in two, family relationships were also disrupted in some respect when the patient worked. For example, one patient's mother resented her son's earning money because it threatened her need to keep him dependent upon her.

Responses to work activities appeared to be conditioned by the relationship to home care of six patients; no such influence was noted for the other two. These six were observed to enjoy the attention of the staff and to seek their approval. In at least one instance a significant element in the patient's motivation for work seemed to be the desire to comply with what the patient believed to be the staff's wishes.

Twenty-two, or 11.3 percent of the patients admitted to home care, accepted work on all or the majority of occasions when it was offered. The fact that 11 percent of a group of severely incapacitated patients proved capable of economically productive activity is significant as an indication of the untapped human resources available among severely disabled homebound persons in the country as a whole.

Certain differences were observed in the characteristics of the patients participating in the project and the home care group as a whole. Project participants were younger; their median age was 51.5 years; for home care, it was 60.1 years. There was an indication that project participants were slightly less ill than home care patients generally; the average number of admissions to the hospital for project patients was 1.1, for home care patients, 1.6.

The 11 patients rejecting work differed from the project group as a whole in several respects. In this group there were more women (72 per-

cent) than in the project group as a whole (55.9 percent), and the median age was older (54.5 years) than the 51.5 median age of the total project group. Also, the median number of years of education was lower (7.3) than for all patients (8.9). There appeared to be no significant differences in the diagnostic categories of the patients who did not accept work and the total project group.

Two reasons were most frequently cited by patients for not working; they did not like the type of work offered, finding it dull, uninteresting, or beneath them, and they felt too ill to work. On the other hand, the staff opinion concerning the majority of these patients was that their refusal to work was on an emotional basis. For example, some patients were too preoccupied with illness to concentrate on work; others had not accepted the limitations of their illnesses sufficiently to be satisfied with the sedentary work of which they were capable.

Costs and Applicability

Experimentation with more than 25 different work plans indicated possibilities for numerous types of work programs of varying costs for the kind of patient found in home care. Program costs will depend on the number of rehabilitation services such as vocational counseling and testing offered and the degree to which the program attempted to fit each patient into an individually suitable job.

Examples of homework programs of varying costs which can be incorporated in medical home care programs and can serve 20 patients follow.

• Minimal cost program confined to one steady contract such as the jobs for the homebound contract with Montefiore Hospital for the packaging of hospital dressings.

Staff (a half-time program supervisor-instructor who would supervise the program and instruct patients in work processes, a full-time pickup and delivery man, a half-time secretary).....	\$8, 100
Travel to patients' homes.....	280
Office supplies.....	95
Occupational licenses.....	25
Overhead (15 percent of direct costs).....	1, 500
Total	\$10, 000

• Medium cost program providing diversified industrial contracts sought from local firms.

Staff (a full-time vocational rehabilitation specialist who would supervise the program, solicit industrial contracts, and instruct patients in work processes; a full-time pickup and delivery man; a half-time secretary) --	\$11,390
Travel to patients' homes-----	360
Travel for solicitation of work-----	300
Office supplies-----	150
Occupational licenses-----	25
Work equipment-----	525
Overhead (15 percent of direct costs)-----	2,250
Total -----	\$15,000

• Relatively expensive program incorporating all service features of jobs for the homebound project including product development and diversified industrial homework contracts.

Staff (a full-time vocational rehabilitation specialist who would supervise the program and be responsible for all industrial homework and for vocational testing and counseling, a design specialist hired as a consultant, a full-time pickup and delivery man, a half-time secretary) -----	\$13,804
Office supplies-----	175
Travel to patients' homes-----	396
Travel for solicitation of work and marketing of products-----	300
Occupational licenses-----	25
Work equipment for patients-----	600
Overhead (15 percent of direct costs)-----	2,700
Total -----	\$18,000

Summary

Jobs for the homebound is a 5-year project concerned with investigating the vocational potential of homebound, chronically ill patients who are generally considered to be too incapacitated for vocational rehabilitation services. The project has been in operation for 2½ years as an integral part of the home care department.

It was found that there was available work which could be performed by seriously ill, homebound patients. In 1 year the project patients put in 3,306 man-hours of productive work and earned from \$1.20 to \$32.88 per week. The patients who worked constituted 11 percent of the patients admitted to home care. This figure is highly significant when it is considered that among the chronically ill, homebound persons throughout the Nation a similar portion also has a potential for productivity.

All patients who worked for a year or longer were reported to have experienced some degree of psychological improvement, primarily reduction of depression. All patients also experienced some degree of improvement in their attitudes toward illness, although it was frequently difficult to tell whether the improvement observed was due to work alone or to the combination of home care services and work.

Experimentation with many different types of work plans indicated that homework programs for the kind of patient found on home care could be operated at reasonable costs, ranging from \$10,000 to \$18,000 per year for 20 home care patients.

Arnold Appointed Assistant Surgeon General

Dr. Richard C. Arnold, chief of the heart disease control program of the Public Health Service for the past 3 years, has been appointed Assistant Surgeon General for Personnel and Training. He succeeds Dr. Otis L. Anderson, who retired on June 30, 1959, after 30 years' service in the commissioned corps.

A career officer of the Service's commissioned corps, Dr. Arnold previously served 6 years as chief of the Technical Services Branch

of the National Heart Institute, after having directed syphilis research at the Venereal Disease Research Laboratory in Staten Island, N.Y., for 13 years. His initial posts with the Service, on completion of his professional studies at the University of Louisville in 1930, were in hospitals in New Orleans and San Francisco in venereal disease work. Dr. Arnold's grade is equivalent to that of brigadier general.

Trends in Occupational Health Programs in State and Local Units

VICTORIA M. TRASKO, A.B., and CHARLES D. YAFFE, M.S.

THE YEAR 1959 has been outstanding in the development of occupational health programs in State and local governments. Both the number of units and personnel reached a new high, exceeding for the first time the 1950 peak. Presently, 484 professional personnel staff 76 occupational health units located in 40 States, including Hawaii, the District of Columbia, and Puerto Rico, and in 33 local health departments. Three of the State programs (New York, Massachusetts, and Illinois) are in departments of labor, and the rest are in health departments. The growth pattern, however, has not been uniform. Nor has the personnel rise been commensurate with the increased responsibilities of State and local occupational health agencies. Frequently, additional staff has been largely absorbed by the newer industrial health problems associated with air pollution and radiation.

Personnel

Growth trends are illustrated by a series of charts based on directories of governmental industrial hygiene personnel issued annually since 1942 by the Occupational Health Branch. Figure 1 shows that the growth in the number

of personnel in local units has been slow but steady. In 1942 they accounted for 10 percent of total staffs, and in 1959, for 20 percent. Total State and local staffs fluctuated from a low of 247 members in 1942 to a high of 425 in 1950, then dropped to a low of 360 in 1957, and rose sharply to the present new high of 484 persons.

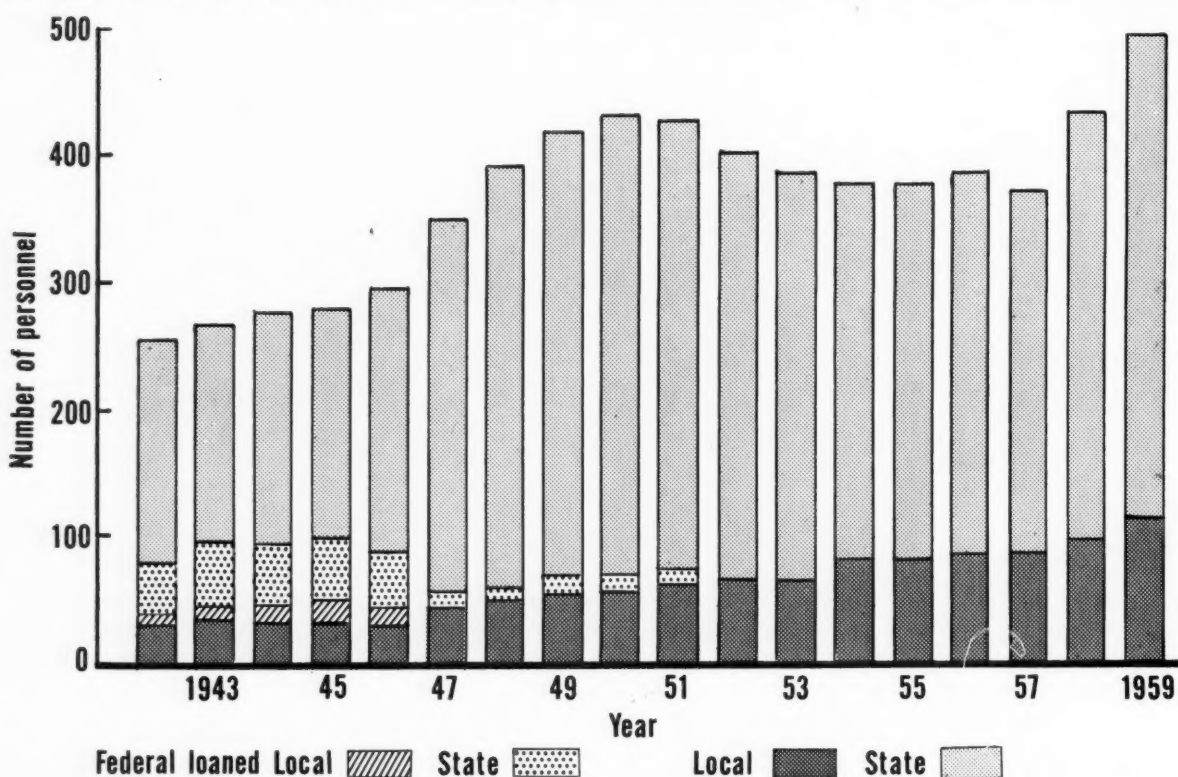
State programs developed most rapidly immediately following the passage of the Social Security Act in 1935, when funds were made available for expansion of public health programs, including industrial hygiene. National defense activities and World War II accelerated the establishment of additional units so that by 1942 there were programs in 36 States and 7 local health departments with a total of 247 professional personnel, including 44 on loan from the Federal Government.

The impetus that led to the 1950 peak in personnel was the designation of Federal grant-in-aid funds for industrial hygiene. Spread over the 3-year period 1947 to 1950, these funds also helped to offset the withdrawal in 1946 of Federal personnel on loan by providing monies for recruitment of trained industrial hygiene personnel being released from military service.

The subsequent discontinuance of earmarked funds and the general decrease in State appropriations resulted in a retrogression in occupational health activity, reflected not only in the loss of personnel but also in the discontinuance of some programs. Part of this decline was also due to the low salary scales then prevailing in government agencies and part to the absorp-

Miss Trasko is program adviser, and Mr. Yaffe, sanitary engineer director, Occupational Health Branch, Bureau of State Services, Public Health Service, Cincinnati, Ohio. The article is based on a paper presented at the Industrial Health Conference in Chicago on April 27, 1959.

Figure 1. Number of occupational health personnel in State and local units, United States, 1942-59



tion of personnel by industry, the armed services, and other agencies that were beginning to employ industrial hygienists at a rapid rate.

All programs were not affected to the same degree. In some instances, their financial situation was stabilized through the appropriation of State air pollution funds for factfinding studies in which the industrial hygiene units cooperated extensively. Otherwise, the setback would have been more serious. It took 8 years to reach the peak in staffs achieved in 1950, a level which was exceeded only this year.

Viewing the long-term growth in staffs, we find that the number of persons in State and local units, exclusive of Federal personnel on loan, has more than doubled since 1942. The growth has been erratic, but the sharp increase from 1957 to 1959 appears indicative of a new upward trend. However, forecasting future growth on the basis of the past is not simple. The fractionation of industrial hygiene programs into specialties, including radiation and air pollution, or the combining of these specialties under one administrative head can readily cause fluctuations in numbers of personnel both

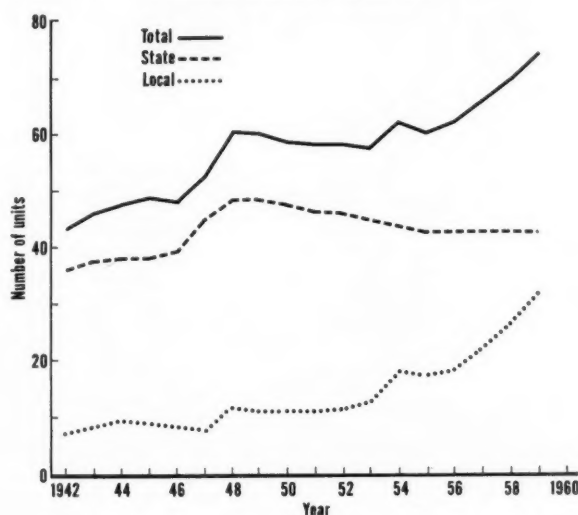
at an individual State as well as the national level.

However, a closer look at the nature of the increase from 1957 to 1959 discloses that 22 State and 18 local units, of which 12 are new, have increased their staffs from 1 to 17 persons, or an aggregate of 137 persons. Six State programs account for one-half of the total staff increases during the period.

In contrast, only seven State and three local programs showed a net decline in personnel. The maximum loss in any unit was 2 persons, and the total loss was 13. Twenty-six units now functioning showed no change.

Today's comeback in personnel is actually greater than the gross numbers show. The present counts are based strictly on information received for annual directories of occupational health personnel in government, and are not all inclusive. For example, they exclude industrial hygienists employed by industrial commissions in at least four States. Likewise, certain local health departments providing limited occupational health services may have escaped attention.

Figure 2. Number of occupational health units, United States, 1942-59



Units

Figure 2 depicts trends in the number of units functioning since 1942. The high point in the number of State units occurred from 1948 to 1950, when all but two States provided occupational health services on at least a limited basis.

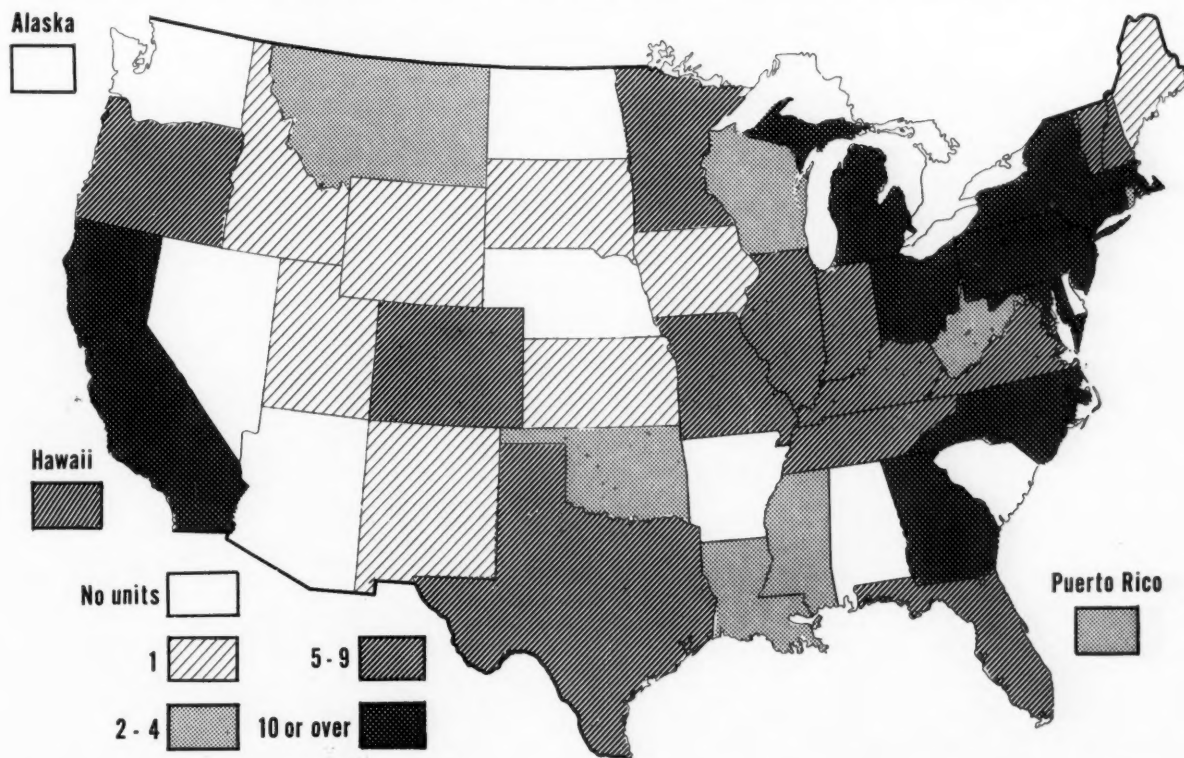
As a result of loss of funds and postwar reduction in industrial activity, a number of States discontinued programs. Today 10 States including Alaska still do not have occupational health programs in either health or labor departments.

On the other hand, local units have shown a gradual upward trend, especially for the last 10 years. In contrast with 7 units in 4 States in 1942, today 33 units are found in 15 States. The effects of vigorous State efforts to encourage the establishment of local occupational health units are evident in California, which has about one-half of these 33 units. This trend for local health departments to assume responsibility in occupational health is highly promising. Local health departments occupy a strategic position in promoting community health in all its aspects.

Size of Units

Although the number of State units has remained stable during recent years, the number of staff members has been increasing since a low

Figure 3. Number of personnel in State occupational health units, United States, 1959



point in 1954. Significantly, at present only 21 percent of the units employ two to four persons, as compared with 48 percent 3 years ago, and units with five or more persons today represent 58 percent of the total as compared with 40 percent in 1947.

There has been no significant pattern for one-man units, although the total number has increased slightly during the past 3 years. The eight units currently in this category are in States which, generally, are not highly industrialized (fig. 3).

With the exception of California, State units with 10 or more persons are located in the eastern part of the country. Units with five to nine persons are scattered, whereas the units with smaller staffs are concentrated chiefly west of the Mississippi River.

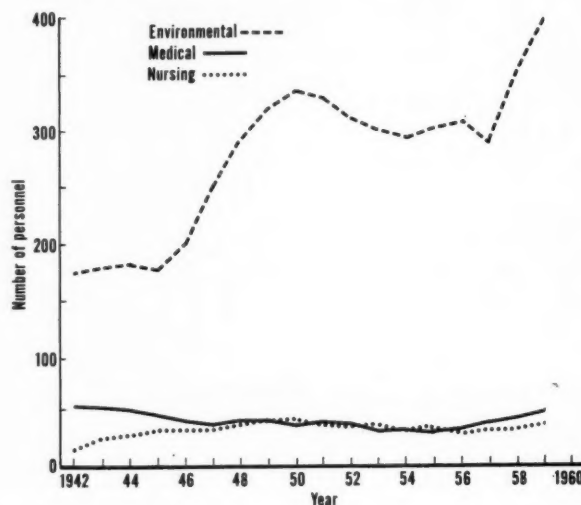
Professional Staffing Patterns

When State and local governments first engaged in occupational health, their primary objectives were improvement of the working environment and elimination of health hazards. Over the years their programs have continued to emphasize environmental studies, with such activities accounting for 70 to 90 percent of all direct services to industry. The need for balanced medical-environmental programs has long been recognized, but their development has been hampered by lack of appropriate personnel and, in some instances, lack of sufficient motivation.

Figure 4 shows clearly the great differential between environmental and medical and nursing personnel. Environmental personnel, consisting of engineers, industrial hygienists, and chemists, accounted for about 70 percent of total staffs during the war years, 1942-46. For the past 10 years, the percentage has hovered about 80.

The present low level of medical personnel in State and local units should not be compared with that during the war period, when about one-half of the physicians were on assignment from the Public Health Service. These units have consistently experienced great difficulty in recruiting and keeping medical personnel. Some gain in industrial nursing consultants was made during the war years. Since then,

Figure 4. Number of environmental, medical, and nursing personnel in State and local occupational health units, United States, 1942-59



their number has remained comparatively the same.

Trends in Program Content

To obtain information on program content, a limited survey was conducted among directors of 12 State and 2 local occupational health units. These units, widely scattered geographically, employ from 5 to more than 50 professional personnel, with an average of 11. While they do not necessarily represent an accurate sample of the entire country, their replies are significant.

In discussing changes of program emphasis, 5 of the 14 directors mentioned increased attention to radiation problems, 2 to air pollution, 1 to silicosis studies and research, and 1 to labeling activities. In five units, the change is toward extending direct services to more establishments as well as to more diverse types of industries. Three directors are actively promoting the establishment of occupational health services in local health departments, and one is expanding appreciably its informational and educational activities.

In considering activities requiring more emphasis, seven directors agreed on the need for more comprehensive or improved coverage of industrial establishments. Four directors men-

tioned the necessity for better educational and informational services to industry, and two expressed a need for closer and better working relationships with industry, the medical profession, and other groups on employee health services. The need for more and better trained personnel in local health departments was also mentioned. Only two directors expressed a need for more emphasis on radiation and one, on air pollution, possibly because most of the other units were already involved. Two directors believed their programs are adequately balanced for the present.

The directors' estimates of total staff time spent on different components of their programs showed a remarkable agreement. For example, 12 of the 14 directors estimated that at least 50 percent of total professional staff time is spent on field investigations and services. The range for the 14 units is 33 to 92 percent, with a median of 67 percent.

About 15 percent of the total staff time is devoted to laboratory services and developmental research, 15 percent to teaching and health education activities, and about 2 percent to civil defense. Individual estimates for civil defense range from 1 to 7 percent. Six of the directors reported that employee health services for State employees required from 1 to 25 percent of staff time, giving a median value of 4 percent.

Eleven of the fourteen directors reported at least 70 percent of staff time spent in the field is devoted to investigation of occupational hazards. The range was 33 to 95 percent, with a median of 81 percent. This indicates that most of these units still concentrate their efforts in the traditional areas of industrial hygiene.

Wide variations were found in the percentage of self-initiated and requested field visits. One unit reported that 100 percent of its field work results from requests; another that requests account for only 6 percent of its field services. For all 14 units the median value for self-initiated field visits is 62.5 percent.

In the directors' opinions, dusts and ionizing radiation constitute the leading problem areas of occupational health, with solvents and gases next in order. Also mentioned were implant health services and noise. The problem areas

receiving most attention are ranked in the following table.

Problem area	Rank			Total
	1st	2d	3d	
Dusts-----	4	2	3	9
Ionizing radiation-----	5	1	2	8
Solvents-----	2	3	1	6
Gases-----	1	2	3	6
Implant health services---	0	2	2	4
Noise-----	0	1	1	2

Two of the directors of State units would not attempt to separate the promotion of implant health services from investigations of occupational hazards. They stated that all personnel regularly attempt to promote improved health services whenever they visit industry for any purpose. The others show a range from 1 to 20 percent, with 8 percent being typical, for total field time spent on this activity.

The occupational aspects of radiation have continued to increase in recent years. While they have added to the total burden of the occupational health unit, no attempt has been made to segregate them as separate items in terms of staff time, since they are considered part of the broad program to control hazards associated with the working environment.

Because of the training and experience of staff members, many occupational health units have also been given overall responsibilities for radiation problems, community as well as occupational. Among the units reporting in this limited survey, an average of about 4 percent of field time is being spent on nonoccupational radiation problems. However, wide variations in this figure may be expected, depending on the extent of activity and size of the unit.

For example, 17 occupational health units maintain fallout stations and monitor air and precipitation for radioactive fallout as participants in the Public Health Service radiation surveillance network program. Many of their personnel have gone on temporary active duty with the Public Health Service to monitor fallout in connection with weapons testing in Nevada. Likewise, many of these personnel are working in radiation instrument phases of civil defense courses and in monitoring instruction. In one State 18 man-days were spent 1 year in instruction alone.

In the larger units these additional duties usually do not represent a heavy burden. How-

ever, smaller units are likely to find these activities taking a much greater proportion of their time, and at the expense of routine work. Many units have helped to draft regulations for the control of radiation sources. Preparing these regulations may require as many man-days for South Dakota with its one-man State unit as for Michigan with a staff of more than 20. Similarly, the time requirements for operating a fallout monitoring station are the same, regardless of staff size. As more and more regulations on radiation are passed, the responsibility and workload of these units will be increased, especially in the registration of users of radioactive materials or operators of X-ray equipment.

The reporting units indicated that air pollution work in general accounts for about 5 percent of field time, although one State estimates 25 percent of its time on this activity. Here, too, however, it is difficult to obtain a representative figure. Because of the extensive experience of occupational health agencies with industrial emissions, these units have frequently been given responsibility for community air pollution. The line between the occupational and community aspects of air pollution sometimes blurs, making it difficult to separate the time spent on each. Because so much air pollution activity is interrelated with industrial hygiene, many occupational health units consider it as part of their routine investigations rather than a separate item.

At present responsibility for air pollution control rests primarily with occupational health units, as reflected by the 1958 Directory of Governmental Air Pollution Agencies (1). Of the 41 State agencies listed, 30 are in occupational health units and 11 are in other units of departments of health. In New York, the State Division of Industrial Hygiene, Department of Labor, shares the responsibility with the New York State Department of Health, and does the sampling of industrial effluents.

Occupational health units also participate in the Public Health Service's national air sampling network. There are 115 air sampling stations throughout the country, including 19 operated by State and local occupational health units.

Air pollution control is primarily a local

problem, with regulatory authority frequently vested in local boards of air pollution control or in smoke abatement agencies, and technical assistance is often provided by local occupational health units. If control authorities are not set up, the burden of handling air pollution problems usually falls on the occupational health unit.

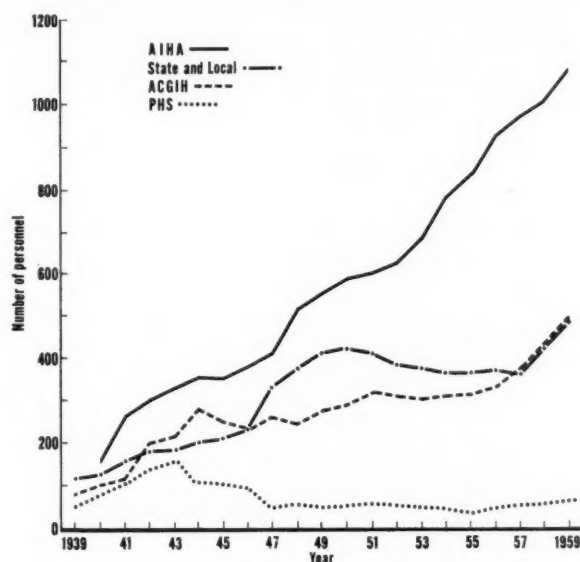
Other Trends

Some State units are stepping up their efforts to encourage the participation of local health departments in occupational health. The growth in number of local units has been mentioned. In addition, there appears to be somewhat greater use of local health department personnel in field activities such as in followup work and in routinely accompanying State personnel on plant visits. The extent to which the States enlist such services varies considerably. This variation may be due partly to the differences in the degree of development of local health services and partly to the lack of conviction in some States of the desirability of utilizing local personnel with limited training in industrial hygiene.

Interest in additional training for personnel is being stimulated by availability of more training facilities and Federal grants and fellowships. Our limited survey showed that 22 persons employed in the 14 units have received a year or more of graduate training during the past 5 years. Some 200 courses of at least 2 weeks' duration have been attended by staff members of these units. Approximately half of these courses have dealt with ionizing radiation. About two-thirds of the remainder have been in industrial hygiene, and the rest were air pollution courses. Likewise, the extent to which State and local personnel participate in training courses for other groups, such as local health department personnel, and in teaching industrial hygiene in schools and universities has also been steadily increasing.

Over the years a handicap to the development of State and local units has been personnel losses and turnover. Since 1942, by actual count of names in the annual directories of government industrial hygiene personnel, 1,470 different persons have been employed at one time or

Figure 5. Occupational health personnel in professional organizations, State and local units, and the Public Health Service, United States, 1939-59



NOTE: AIHA=members of American Industrial Hygiene Association. ACGIH=members of American Conference of Governmental Industrial Hygienists. PHS=professional staff of the Occupational Health Branch, Public Health Service, including personnel on loan to State and local units.

another by State and local units and the Occupational Health Branch of the Public Health Service. Subtraction of the number of persons on current staffs reveals that more than 900, many with excellent training and experience, have left official occupational health agencies for one reason or another during the past 18 years. However, many have remained in the industrial hygiene field, employed by industry, universities, the armed services, and other groups.

In the absence of data on employment of industrial hygienists outside government, the annual membership of the American Conference of Governmental Industrial Hygienists and the American Industrial Hygiene Association and personnel in the State and local units, starting with 1939, have been plotted in figure 5.

The rapidity of growth of the American Industrial Hygiene Association indicates the extent to which industry is employing industrial hygienists. Although a number of association members are in government, the curve provides

a rough idea of the number of industrial hygiene personnel associated with nongovernment work.

If personnel requirements expressed by directors of State and local units interviewed in this survey are typical of present national needs, full-time occupational health staffs in State and local units should number at least 1,000. However, even this figure, more than double the present number, is a ratio of only 1 person for every 65,000 workers in the labor force.

Finally, there is definite evidence of increased financial support for some State and local programs from their own departments. This support was variously attributed. Eleven of the fourteen directors interviewed consider their engineering studies and services to industry their best selling points. Some mentioned specifically the quality and objectiveness of their studies; others, the high professional caliber of work performance which has caused industry to accept government services. Radiation and air pollution activities were mentioned as being popular and helpful in getting appropriations. One director credited his program's financial stimulus to a Statewide conference on occupational health sponsored by the Governor's Council; another to special training courses held for industrial personnel.

Other selling points specified were dissemination of information on industrial health through periodic bulletins and short pamphlets and working with professional organizations and medical groups to bring about a better understanding of industrial health and the contribution of government programs.

One director credits the effective support his program receives to excellent administration by his health commissioner, cooperation with other branches and agencies, and willingness to accept broader responsibilities. This point, the importance of being willing to accept broader responsibilities, cannot be overemphasized in a field with as infinite opportunities for service as occupational health.

Conclusion

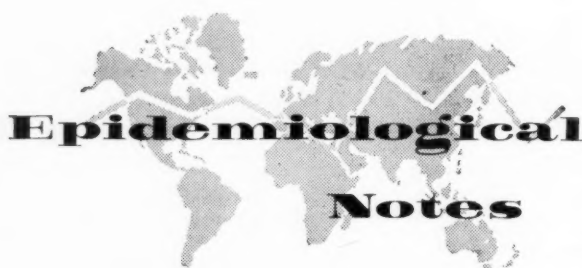
Recent growth trends in State and local occupational health units hold promise that the occupational health picture may be improving.

However, these changes mark only a beginning, since occupational health activities in general have long been grossly underdeveloped. Today's record staffs fall at least 50 percent short of the number needed to do a halfway adequate job. It is particularly encouraging to note the increase in local units, and it is hoped that this

tendency and the strengthening of all official agency staffs will continue.

REFERENCE

- (1) 1958 Directory of Governmental Air Pollution Agencies. Pittsburgh, Pa., Air Pollution Control Association in cooperation with the Public Health Service, 1958, 48 pp.



Encephalomyelitis in Horses

An early classic clinical description of what appears to have been western encephalomyelitis in horses has been found by Dr. Roy F. Feemster in a footnote to the section on poliomyelitis in the 1909 annual report of the Massachusetts State Board of Health. The footnote consisted of a letter from a practicing veterinarian in Minnesota describing a paralytic disease in horses, and formed a part of a discussion on sickness in animals and poliomyelitis in man. At that time, investigators were looking for evidence of a relationship between paralytic disease in animals and in man. The veterinarian may have been led to write the letter because of a high incidence of poliomyelitis in both Minnesota and Massachusetts in 1909. It is recognized now that the veterinarian probably was describing cases of western equine encephalomyelitis.

The first clinical description of encephalomyelitis in horses may have been made as early as 1831 following an outbreak of paralytic disease in Massachusetts. Dr. Alfred Large described a similar disease on Long Island in 1867.

The entire footnote, including the letter from Dr. C. S. Shore, Lake City, Minn., follows:

"The following letter, which reached the board through the State Board of Health of Minnesota, is of possible interest in this connection:

"In my veterinary practice during the past 5 or 6 years, I have found a disease appearing among

1- and 2-year-old colts that shows a line of symptoms corresponding very closely to anterior poliomyelitis of children. I have had from 5 to 10 cases a year during this time, the cases always occurring during the summer months, and the majority of them during the month of August. The affected colts are usually found in the pasture, unable to stand. The owner sometimes will notice an unsteady gait for 24 hours before entire loss of motion occurs. At first, these colts have a rise of temperature, ranging from 103° to 104° F.; pulse and respiration accelerated; animal sweats profusely; appetite remains fairly good, but there is some trouble noticed in swallowing, especially water; slight derangement of the bowels, tending toward constipation; more or less tympanitis present; retention of urine, for a few hours at least; head drawn back so the end of the nose tends to assume a position somewhat on a line with the neck. The death loss is less than 10 percent, but in those that do recover, the market value is depreciated to a very great extent because of the faulty gait the animal assumes after an attack of this disease, due to atrophy and contraction of certain muscles or certain groups of muscles. It seems that the flexor muscles of the limbs especially are more often affected than the extensor, and in almost all the cases some of these deformities are likely to remain permanent. The flexors of the limbs are liable to contract and cause volar flexion of the fetlock. The elevators of the head are also likely to become affected so as to cause the head to have a poky appearance; that is, it is carried out from the body.

"After one of these attacks the colt will remain down from 1 to 3 weeks, and will then continue to improve for a period of 1 year, but seldom, if ever, makes a complete recovery."

Dr. Feemster is director of the division of communicable diseases, Massachusetts Department of Public Health—CARL C. DAUER, M.D., *medical adviser, National Office of Vital Statistics.*

STATEMENT

*By Arthur S. Flemming, Secretary of Health,
Education, and Welfare, June 30, 1959*

Wax Used for Milk and Food Containers

I AM INFORMED that both the Food and Drug Administration and the Public Health Service are receiving many inquiries about possible cancer-producing agents in wax used for milk cartons and other food containers.

I think we should try to clarify the situation with respect to these waxes.

During the latter part of 1956, Dr. W. C. Hueper, of the Public Health Service, arranged with the Milk Industry Foundation to collect waxes used by dairies for the impregnation of milk containers. Several months later the foundation assembled about 40 waxes for further chemical and biological analysis and sent them to the National Cancer Institute. In June 1957, 24 of these waxes were sent for study to Dr. Philippe Shubik, division of chemistry, Chicago Medical School. Dr. Hueper provided Dr. Shubik with suggestions for the work and data on the economic, chemical, and biological aspects of dairy waxes. A representative sample of each of these waxes was retained by the National Cancer Institute's Environmental Cancer Section of which Dr. Hueper is chief.

In the fall of 1957, Dr. Hueper received a report from Dr. Shubik on results of preliminary tests of the 24 waxes. The studies were performed by Dr. William Lijinsky, an associate of Dr. Shubik's. It was demonstrated in these studies that one of the waxes contained a known carcinogen (cancer-producing agent), 1,2,5,6-dibenzanthracene. Three additional waxes were suspected but no carcinogen could be identified. It should be noted that while this compound has produced cancer in laboratory animals, 1,2,5,6-dibenzanthracene has not been shown to produce cancer in man.

A report of the results of this investigation was communicated to Ernest Kellogg, secretary of the Milk Industry Foundation. As a result, Mr. Kellogg asked the American Petroleum Institute for assistance in investigating the problem.

Dairy industry representatives also met with Public Health Service milk and food personnel to map out a program to assure that the waxes used were free from impurities. In November 1957, the American Petroleum Institute made available \$100,000 a year for 5 years to support additional studies by Dr. Shubik (Dr. Shubik has indicated that the results will be published as the studies are completed).

Accordingly, Dr. Shubik was supplied an additional sample of 26 representative waxes by the petroleum industry. By the time these new samples were received, Dr. Shubik had improved his analytical techniques to the point where he could identify as little as 1 part of 1,2,5,6-dibenzanthracene in one-half billion parts of wax. In the earlier experiments, sensitivity was 1 part of 1,2,5,6-dibenzanthracene in 1 million parts of wax. With the high sensitivity of the new techniques, no dibenzanthracene has been found in any of the 26 samples.

Meanwhile, in 1958, samples of the 24 waxes sent to Dr. Shubik by Dr. Hueper in 1957 also were sent to Dr. Paul Kotin, associate professor of pathology at the University of Southern California. The major results of this study, made by Falk, Kotin, and Miller, were published in the April 25, 1959, issue of a British scientific journal, *Nature*, pp. 1184-85.

The Kotin investigations confirmed the Shubik findings that one wax contained between

0.5 and 1.0 micrograms per gram of 1,2,5,6-dibenzanthracene. The Kotin investigations demonstrated, in addition, that 1,2,5,6-dibenzanthracene added to dairy waxes for experimental purposes was extracted from thin layers of wax by milk.

The results of these studies have been reviewed by scientists of both the Public Health Service and the Food and Drug Administration. I am advised that the findings are not final, but no indications of a health hazard have been found. The Food and Drug Administration advises there is at present no basis for action concerning these waxes under the Food, Drug, and Cosmetic Act.

The scientists are also agreed that more information is needed. The Food and Drug Administration plans a study of these waxes in its own laboratories if its appropriation for 1960 as now approved by both House and Senate is finally enacted. The Public Health Service also plans to support further studies and to provide technical assistance to the industry in its control program.

It should be pointed out that the new food additives amendment to the Federal Food, Drug, and Cosmetic Act covers the safety of food container materials which incidentally contaminate food, just as it covers additives for direct addition to food.

Permits for Nuclear Waste Disposition

Pennsylvania's Sanitary Water Board has announced seven permits for the discharge of radioactive wastes into streams. Radioactivity of the discharged material is limited to minute levels, and all safeguards are taken to assure that these levels are trivial or insignificant to public health.

The first of these permits, issued November 1, 1957, was for wastes discharged by the Duquesne Light Co. of Pittsburgh into the Ohio River from Shippingport. (*Public Health Reports*, October 1958, pp. 895-901.) Others issued in 1958 were:

March 24. Research laboratory of Mellon Institute of Industrial Research in Penn Township, Westmoreland County, discharging into Bushy Run, tributary of the Monongahela River and two creeks.

March 26. (Amended August 21, 1958.) Research reactor facility of Curtiss-Wright Corporation of Woodridge, N.J., in Covington Township, Clearfield County, discharging into a tributary of Mosquito Creek, flowing into a branch of the Susquehanna River.

March 26. Metallurgical plant of L & S

Machine Co., Inc., of Latrobe, in Unity Township, Westmoreland County, discharging into Four Mile Run, tributary of Loyalhanna Creek.

March 26. Plant for research, development, and manufacture of nuclear reactor components of the Nuclear Materials and Equipment Corporation, of Apollo, in Apollo Borough, Armstrong County, discharging indirectly into the Kiskiminetas River.

April 26. Metallurgical plant processing naturally radioactive metals and producing fuel elements, of Westinghouse Electric Corporation of Pittsburgh, in Derry Township, Westmoreland County, discharging into the Conemaugh River.

May 26. Research reactor of Pennsylvania State University at State College, Centre County, discharging into Thompson Run, tributary of two creeks.

December 23. Testing reactor of Westinghouse Electric Corporation of Pittsburgh, in Sewickley and Hempfield Townships, Westmoreland County, discharging into a tributary of Sewickley Creek.

State and Local Government Expenditures for Health and Hospitals

MARJORIE GOOCH, Sc.D

FOR THE FIRST TIME since 1942, State-by-State data are available on the expenditures of State and local governments for the major functions of these governments (1). The Bureau of the Census obtained these data on the then 48 States and the District of Columbia as part of the 1957 Census of Governments. Although the Census Bureau annually publishes financial statistics for State governments and for cities of more than 25,000 inhabitants (2), similar data for local governments have been available only as estimated nationwide totals. Four functions—education, highways, public welfare, and health and hospitals—accounted for nearly three-fourths of the total State-local general expenditures in 1957. General expenditures represent the amounts spent for public programs but exclude State-owned and State-operated enterprises and trust fund operations.

Of the total general expenditures by State and local governments of \$40.4 billion, health and hospitals accounted for \$3.2 billion—\$2.6 billion for hospitals and \$0.6 billion for health. New York State spent the largest amount for health and hospitals combined (\$521.5 million) and South Dakota the smallest amount (\$5.6 million). Expenditures for hospitals ranged from \$446.0 million in New York State to \$4.1 million in Vermont. Expenditures for health varied from \$75.5 million in New York to somewhat less than \$1 million in Nevada.

Dr. Gooch is a public health research analyst in the Division of Public Health Methods, Public Health Service.

On a per capita basis, the average expenditure by State and local governments for health and hospitals combined was \$18.80; for hospitals, \$15.56, and for health, \$3.24. Aside from the District of Columbia, the State with the highest per capita expenditure for health and hospitals together (New York) spent \$32.30; the State with the lowest per capita expenditure for this purpose (South Dakota) spent about one-fourth this amount, or \$8.06. By far the larger part of these expenditures for health and hospitals went to hospitals; per capita outlays for hospitals (again omitting the District of Columbia) ranged from \$27.62 in New York to \$6.34 in South Dakota. Per capita expenditures for health varied from \$7.93 in Washington to \$1.34 in Iowa.

According to Census Bureau definitions (2), hospital expenditures are the expenditures of State and local governments for the support of hospital facilities (and institutions for the care and treatment of the handicapped) that are established or operated by these governmental units, for the provision of hospital care in private or other governmental hospitals, and for the support of other public or private hospitals. Included are expenditures for hospital facilities operated in conjunction with State colleges or universities as well as payments by the governmental units of hospital bills for the needy and for other classes of the public.

Health expenditures are the amounts spent by State and local governments for public health services and for vendor payments for medical supplies and services, excluding payments for hospital care. Public health services

Table 1. Health and hospital expenditures of State and local governments, 1957

States ranked by 1957 per capita income	Per capita				Total amount (thousands)		
	Personal income	Health and hospital expendi- tures	Hospital expendi- tures	Health expendi- tures	Health and hospital expendi- tures	Hospital expendi- tures	Health expendi- tures
United States.....	\$2, 027	\$18. 80	\$15. 56	\$3. 24	\$3, 202, 107	\$2, 650, 240	\$551, 867
Median State.....	1, 836	16. 04	12. 76	2. 90	34, 815	29, 055	6, 245
States with per capita incomes above U.S. average							
Connecticut.....	\$2, 821	\$23. 00	\$19. 03	\$3. 97	\$52, 171	\$43, 171	\$9, 000
Delaware.....	2, 740	17. 34	14. 28	3. 06	7, 528	6, 199	1, 329
New York.....	2, 578	32. 30	27. 62	4. 68	521, 506	446, 004	75, 502
California.....	2, 523	24. 02	19. 67	4. 35	333, 441	273, 038	60, 403
District of Columbia.....	2, 514	35. 75	30. 53	5. 22	29, 315	25, 035	4, 280
New Jersey.....	2, 504	18. 91	16. 16	2. 75	106, 213	90, 749	15, 464
Illinois.....	2, 447	17. 76	13. 97	3. 79	172, 197	135, 460	36, 737
Nevada.....	2, 423	31. 07	27. 41	3. 66	8, 141	7, 182	959
Massachusetts.....	2, 335	30. 57	24. 70	5. 87	147, 564	119, 244	28, 320
Ohio.....	2, 255	14. 92	12. 40	2. 52	137, 366	114, 144	23, 222
Maryland.....	2, 156	20. 13	16. 38	3. 75	58, 256	47, 413	10, 843
Michigan.....	2, 141	24. 12	20. 77	3. 35	185, 849	160, 051	25, 798
Washington.....	2, 128	22. 57	14. 64	7. 93	61, 506	39, 890	21, 616
Pennsylvania.....	2, 112	14. 89	12. 12	2. 77	163, 921	133, 475	30, 446
Wyoming.....	2, 038	24. 97	21. 93	3. 04	7, 918	6, 953	965
States with per capita incomes below U.S. average							
Indiana.....	\$2, 010	\$16. 38	\$14. 61	\$1. 77	\$73, 793	\$65, 826	\$7, 967
Colorado.....	1, 996	16. 95	14. 57	2. 38	28, 180	24, 230	3, 950
Rhode Island.....	1, 990	17. 65	13. 91	3. 74	15, 125	11, 918	3, 207
Missouri.....	1, 940	14. 26	12. 42	1. 84	60, 452	52, 648	7, 804
Wisconsin.....	1, 920	19. 39	16. 79	2. 60	74, 853	64, 813	10, 040
Oregon.....	1, 914	15. 94	10. 72	5. 22	27, 777	18, 683	9, 094
Montana.....	1, 896	13. 08	10. 41	2. 67	8, 772	6, 982	1, 790
New Hampshire.....	1, 862	23. 42	17. 30	6. 12	13, 417	9, 912	3, 505
Minnesota.....	1, 850	23. 45	19. 58	3. 87	77, 821	64, 984	12, 837
Florida.....	1, 836	19. 43	15. 32	4. 11	81, 805	64, 492	17, 313
Nebraska.....	1, 818	14. 13	12. 55	1. 58	20, 301	18, 032	2, 269
Iowa.....	1, 806	14. 08	12. 74	1. 34	39, 209	35, 469	3, 740
Texas.....	1, 791	11. 36	9. 66	1. 70	104, 193	88, 631	15, 562
Kansas.....	1, 787	17. 21	14. 91	2. 30	36, 133	31, 304	4, 829
Arizona.....	1, 750	12. 00	9. 11	2. 89	12, 935	9, 823	3, 112
Utah.....	1, 694	12. 63	9. 59	3. 04	10, 605	8, 052	2, 553
New Mexico.....	1, 686	17. 18	13. 17	4. 01	13, 964	10, 706	3, 258
Vermont.....	1, 665	15. 39	11. 01	4. 38	5, 693	4, 073	1, 620
Maine.....	1, 663	13. 33	10. 34	2. 99	12, 521	9, 710	2, 811
Virginia.....	1, 660	13. 82	10. 92	2. 90	52, 914	41, 820	11, 094
Idaho.....	1, 630	16. 04	12. 76	3. 28	10, 340	8, 227	2, 113
Oklahoma.....	1, 619	11. 69	9. 77	1. 92	26, 377	22, 049	4, 328
Louisiana.....	1, 566	16. 26	13. 51	2. 75	49, 866	41, 424	8, 442
West Virginia.....	1, 554	9. 18	7. 50	1. 68	18, 021	14, 729	3, 292
South Dakota.....	1, 531	8. 06	6. 34	1. 72	5, 588	4, 396	1, 192
North Dakota.....	1, 435	13. 57	9. 88	3. 69	8, 756	6, 375	2, 381
Georgia.....	1, 431	19. 27	16. 27	3. 00	72, 683	61, 354	11, 329
Tennessee.....	1, 383	14. 59	11. 89	2. 70	50, 251	40, 945	9, 306
Kentucky.....	1, 372	9. 92	7. 76	2. 16	30, 206	23, 627	6, 579
Alabama.....	1, 324	11. 02	9. 05	1. 97	34, 815	28, 601	6, 214
North Carolina.....	1, 317	12. 74	10. 62	2. 12	56, 946	47, 473	9, 473
South Carolina.....	1, 180	14. 16	12. 27	1. 89	33, 523	29, 055	4, 468
Arkansas.....	1, 151	10. 34	8. 51	1. 83	18, 409	15, 143	3, 266
Mississippi.....	958	10. 60	7. 72	2. 88	22, 971	16, 726	6, 245

include public health administration, research, nursing, immunization, clinics, and other general health activities (other than "hospital" activities). They include expenditures for such programs as health examinations and inspections, maternal and child health, school health activities of health departments (but not of school departments), control of cancer, tuberculosis, and mental illness, and other categorical and environmental health activities.

The expenditures reported here are financed from revenue and borrowing, including as revenue amounts received in the form of grants-in-aid from the Federal Government, patient fees, and rental revenues, as well as taxes.

Table 1 shows the per capita expenditures and the dollar amounts for health and hospital services for each State. The States are listed in the order of per capita personal income. Connecticut is at the top, with a per capita income of \$2,821, and Mississippi is at the bottom with a per capita income of \$958.

The median State had a per capita income of \$1,836. The median per capita expenditure for health and hospitals combined was \$16.04; for hospitals it was \$12.76, and for health, \$2.90. In general, States with high per capita incomes reported above-average State and local outlays for health and hospitals combined and for hospitals. The correlation between per capita income and per capita expenditure for health services is less marked.

Of the total \$3.2 billion spent for health and hospitals, \$1.7 billion represents the expenditures of State governments and \$1.5 billion the expenditures of local governments. The amounts expended by State governments varied from \$236 million in New York to slightly less than \$2 million in Nevada. Local government expenditures for this function ranged from a high of \$285 million in New York to a low of \$311,000 in Delaware (table 2).

Although for the United States as a whole, State governments and local governments were about equally responsible for health and hospital expenditures, in 30 States the expenditures of the State government exceeded those of the local governments. In eight States the expenditures of the State government accounted for 80 percent or more of the health and hospital

outlays. At the other extreme, in three States the expenditures of the State government accounted for less than 30 percent of the total health and hospital expenditures (table 3).

No geographic pattern is evident in the division of health and hospital program responsibilities between State governments and local governments. For example, in California local governments spent 63 cents of each dollar, but in Washington and Oregon, only 39 and 29 cents respectively. In New York about 55 cents of each dollar represents local expenditures, and in New Jersey the figure is 61 cents, but in Connecticut, it is only 15 cents. In Georgia local governments spent 66 percent of the total health and hospital expenditures; in Alabama, 56 percent; in Mississippi, 49 percent; in Arkansas, 40 percent; and in Louisiana, 19 percent (table 3).

A total of \$111 million of Federal aid went to State governments to finance these health and hospital expenditures. State governments granted \$253 million to local governmental units for these functions, and \$60 million of local funds was paid to State governments as reimbursement for services performed by the States for localities.

Federal grants to State governments for health and hospital programs ranged from \$8 million in Texas to \$366,000 in Delaware. State aid to local governments ranged from a high of \$73 million in New York to a low of \$16,000 in Maine and New Hampshire. Local governments in 35 States made payments to their respective State governments for health and hospitals ranging from almost \$12 million in New Jersey to \$1,000 in Texas (table 2).

For the United States as a whole (exclusive of the District of Columbia), Federal funds accounted for 3.5 percent of the total expenditures for health and hospitals. In New York Federal funds represented less than 1 percent, but in Alabama and Arkansas they represented 13.8 percent of the total. In 33 States, the proportion of Federal funds exceeded the average of 3.5 percent, and in 19 States it exceeded twice this average. In general, Federal funds accounted for a larger proportion of program outlays in the agricultural and low-income States than in the industrial, high-

Table 2. State and local expenditures for health and hospitals and transfers of funds between governments, 1957
[Thousands of dollars]

States ranked by 1957 per capita income	Final spending unit			Intergovernmental transfer of funds		
	Total	State	Local	From Federal to State	From local to State	From State to local
United States.....	\$3, 202, 107	\$1, 652, 288	\$1, 549, 819			
United States exclusive of District of Columbia.....	3, 172, 792	1, 652, 288	1, 520, 504	¹ \$111, 202	\$60, 264	\$253, 072
States with per capita incomes above U.S. average						
Connecticut.....	\$52, 171	\$44, 436	\$7, 735	\$969	0	\$284
Delaware.....	7, 528	7, 217	311	366	0	0
New York.....	521, 506	236, 037	285, 469	4, 499	\$858	73, 151
California.....	333, 441	123, 216	210, 225	4, 939	2, 507	15, 667
New Jersey.....	166, 213	41, 838	64, 375	1, 490	11, 657	4, 837
Illinois.....	172, 197	105, 819	66, 378	3, 472	251	10, 958
Nevada.....	8, 141	1, 850	6, 291	665	59	267
Massachusetts.....	147, 564	79, 799	67, 765	1, 473	406	29, 818
Ohio.....	137, 366	72, 995	64, 371	3, 857	3, 766	3, 522
Maryland.....	58, 256	42, 628	15, 628	1, 893	2, 612	1, 460
Michigan.....	185, 849	93, 026	92, 823	4, 534	6, 466	13, 361
Washington.....	61, 506	37, 356	24, 150	1, 061	0	9, 231
Pennsylvania.....	163, 921	137, 357	26, 564	6, 438	0	5, 246
Wyoming.....	7, 918	2, 175	5, 743	578	13	234
States with per capita incomes below U.S. average						
Indiana.....	\$73, 793	\$37, 076	\$36, 717	\$2, 075	\$947	\$7, 134
Colorado.....	28, 180	16, 102	12, 078	1, 272	0	571
Rhode Island.....	15, 125	13, 059	2, 066	953	0	200
Missouri.....	60, 452	24, 610	35, 842	2, 417	1, 110	1, 580
Wisconsin.....	74, 853	21, 493	53, 360	1, 426	2, 138	16, 089
Oregon.....	27, 777	19, 708	8, 069	690	0	88
Montana.....	8, 772	5, 888	2, 884	629	0	49
New Hampshire.....	13, 417	8, 339	5, 078	471	25	16
Minnesota.....	77, 821	33, 598	44, 223	3, 382	2, 219	17, 097
Florida.....	81, 805	34, 396	47, 409	3, 146	3, 680	3, 194
Nebraska.....	20, 301	13, 860	6, 441	614	5, 174	147
Iowa.....	39, 209	19, 489	19, 720	1, 752	9, 802	807
Texas.....	104, 193	52, 513	51, 680	8, 059	1	1, 370
Kansas.....	36, 133	23, 143	12, 990	1, 441	0	3, 910
Arizona.....	12, 935	5, 133	7, 802	732	0	788
Utah.....	10, 605	4, 934	5, 671	1, 018	100	479
New Mexico.....	13, 964	8, 322	5, 642	1, 830	51	526
Vermont.....	5, 693	4, 861	832	369	0	0
Maine.....	12, 521	10, 253	2, 268	610	61	16
Virginia.....	52, 914	40, 928	11, 986	2, 484	924	1, 904
Idaho.....	10, 340	4, 868	5, 472	1, 243	209	436
Oklahoma.....	26, 377	18, 796	7, 581	2, 146	301	362
Louisiana.....	49, 866	40, 460	9, 406	3, 210	0	2, 244
West Virginia.....	18, 021	10, 261	7, 760	1, 717	218	416
South Dakota.....	5, 588	3, 918	1, 670	566	935	137
North Dakota.....	8, 756	7, 945	811	640	423	95
Georgia.....	72, 683	24, 783	47, 900	5, 442	0	7, 137
Tennessee.....	50, 251	21, 316	28, 935	3, 828	2, 347	2, 204
Kentucky.....	30, 206	14, 419	15, 787	2, 130	40	1, 868
Alabama.....	34, 815	15, 363	19, 452	4, 811	761	5, 465
North Carolina.....	56, 946	30, 845	26, 101	5, 270	123	4, 168
South Carolina.....	33, 523	13, 045	20, 478	3, 015	54	3, 040
Arkansas.....	18, 409	11, 017	7, 392	2, 547	7	865
Mississippi.....	22, 971	11, 798	11, 173	3, 033	19	634

¹ Excludes approximately \$2 million Federal grants to local governments.

Table 3. Percentage distribution of health and hospital expenditures between State and local governments by final spending unit and source of funds, 1957

States ranked by 1957 per capita income	Final spending unit		Source of financing (after allowance for intergovernmental transfers)		
	State	Local	Federal	State	Local
United States, exclusive of District of Columbia.....	52.1	47.9	¹ 3.5	54.7	41.8
States with per capita incomes above U.S. average					
Connecticut.....	85.2	14.8	1.8	83.9	14.3
Delaware.....	95.9	4.1	4.9	91.0	4.1
New York.....	45.3	54.7	0.9	58.2	40.9
California.....	37.0	63.0	1.5	39.4	59.1
New Jersey.....	39.4	60.6	1.4	31.6	67.0
Illinois.....	61.5	38.5	2.0	65.7	32.3
Nevada.....	22.7	77.3	8.2	17.1	74.7
Massachusetts.....	54.1	45.9	1.0	73.0	26.0
Ohio.....	53.1	46.9	2.8	50.2	47.0
Maryland.....	73.2	26.8	3.3	67.9	28.8
Michigan.....	50.1	49.9	2.4	51.3	46.3
Washington.....	60.7	39.3	1.7	74.0	24.3
Pennsylvania.....	83.8	16.2	3.9	83.1	13.0
Wyoming.....	27.5	72.5	7.3	23.0	69.7
States with per capita incomes below U.S. average					
Indiana.....	50.2	49.8	2.8	55.8	41.4
Colorado.....	57.1	42.9	4.5	54.7	40.8
Rhode Island.....	86.3	13.7	6.3	81.4	12.3
Missouri.....	40.7	59.3	4.0	37.5	58.5
Wisconsin.....	28.7	71.3	1.9	45.4	52.7
Oregon.....	71.0	29.0	2.5	68.8	28.7
Montana.....	67.1	32.9	7.2	60.5	32.3
New Hampshire.....	62.2	37.8	3.5	58.6	37.9
Minnesota.....	43.2	56.8	4.4	57.9	37.7
Florida.....	42.0	58.0	3.8	37.6	58.6
Nebraska.....	68.3	31.7	3.0	40.5	56.5
Iowa.....	49.7	50.3	4.5	22.3	73.2
Texas.....	50.4	49.6	7.7	44.0	48.3
Kansas.....	64.0	36.0	4.0	70.9	25.1
Arizona.....	39.7	60.3	5.7	40.1	54.2
Utah.....	46.5	53.5	9.6	40.5	49.9
New Mexico.....	59.6	40.4	13.1	49.9	37.0
Vermont.....	85.4	14.6	6.5	78.9	14.6
Maine.....	81.9	18.1	4.9	76.6	18.5
Virginia.....	77.3	22.7	4.7	74.5	20.8
Idaho.....	47.1	52.9	12.0	37.3	50.7
Oklahoma.....	71.3	28.7	8.1	63.4	28.5
Louisiana.....	81.1	18.9	6.4	79.2	14.4
West Virginia.....	56.9	43.1	9.5	48.5	42.0
South Dakota.....	70.1	29.9	10.1	45.7	44.2
North Dakota.....	90.7	9.3	7.3	79.7	13.0
Georgia.....	34.1	65.9	7.5	36.4	56.1
Tennessee.....	42.4	57.6	7.6	34.5	57.9
Kentucky.....	47.7	52.3	7.1	46.7	46.2
Alabama.....	44.1	55.9	13.8	43.8	42.4
North Carolina.....	54.2	45.8	9.3	52.0	38.7
South Carolina.....	38.9	61.1	9.0	38.8	52.2
Arkansas.....	59.8	40.2	13.8	50.7	35.5
Mississippi.....	51.4	48.6	13.2	40.8	46.0

¹ Excludes less than 1 percent Federal grants to local governments.

Table 4. Percentage distribution of general expenditures of State and local governments by major functions, 1957

States ranked by 1957 per capita income	Education	Highways	Public welfare	Health and hospitals	All other
United States.....	35.0	19.3	8.4	7.9	29.4
United States, exclusive of District of Columbia.....	35.0	19.4	8.4	7.9	29.3
States with per capita incomes above U.S. average					
Connecticut.....	29.1	32.9	5.4	7.1	25.5
Delaware.....	39.9	21.6	5.3	7.1	26.1
New York.....	30.0	13.1	7.4	10.9	38.6
California.....	37.2	14.5	9.1	7.5	31.7
District of Columbia.....	21.0	8.6	6.3	15.8	48.3
New Jersey.....	33.3	16.3	4.3	8.0	38.1
Illinois.....	34.3	19.3	7.2	7.8	31.4
Nevada.....	25.9	24.2	4.2	8.5	37.2
Massachusetts.....	24.1	21.0	10.6	10.5	33.8
Ohio.....	36.3	20.5	7.9	6.7	28.6
Maryland.....	32.5	23.0	4.0	8.4	32.1
Michigan.....	40.2	18.0	6.2	9.2	26.4
Washington.....	36.0	20.0	10.6	7.9	25.5
Pennsylvania.....	36.0	16.6	7.2	7.6	32.6
Wyoming.....	36.5	28.3	5.3	7.6	22.3
States with per capita incomes below U.S. average					
Indiana.....	43.3	18.0	5.8	7.9	25.0
Colorado.....	36.4	19.1	15.8	6.0	22.7
Rhode Island.....	29.1	17.4	10.4	8.4	34.7
Missouri.....	33.4	19.4	15.2	7.2	24.8
Wisconsin.....	32.1	22.3	7.6	8.0	30.0
Oregon.....	38.8	21.3	6.9	5.9	27.1
Montana.....	36.0	28.0	7.4	4.6	24.0
New Hampshire.....	29.8	30.3	6.7	9.6	23.6
Minnesota.....	39.2	20.8	8.3	9.1	22.6
Florida.....	30.1	20.7	7.1	8.2	33.9
Nebraska.....	38.7	25.3	6.7	7.0	22.3
Iowa.....	38.9	27.7	8.9	6.0	18.5
Texas.....	39.5	21.5	8.4	5.6	25.0
Kansas.....	33.5	30.2	8.2	6.3	21.8
Arizona.....	41.9	18.4	6.5	4.4	28.8
Utah.....	45.2	17.7	7.9	5.4	23.8
New Mexico.....	39.3	23.9	7.3	6.2	23.3
Vermont.....	34.3	30.0	8.4	6.2	21.1
Maine.....	30.6	27.6	9.1	6.4	26.3
Virginia.....	36.3	25.5	3.6	7.4	27.2
Idaho.....	35.0	25.7	7.4	6.9	25.0
Oklahoma.....	35.6	21.7	18.7	4.7	19.3
Louisiana.....	31.3	18.1	16.6	5.9	28.1
West Virginia.....	40.9	19.5	11.4	5.9	22.3
South Dakota.....	34.9	32.2	6.7	3.3	22.9
North Dakota.....	31.8	28.5	6.3	5.2	28.2
Georgia.....	36.7	16.9	11.1	10.4	24.9
Tennessee.....	36.0	21.6	9.0	8.9	24.5
Kentucky.....	36.0	22.1	11.0	6.4	24.5
Alabama.....	31.6	24.4	12.9	6.2	24.9
North Carolina.....	40.4	20.9	7.4	7.9	23.4
South Carolina.....	43.4	16.4	8.1	9.1	23.0
Arkansas.....	35.5	23.2	13.0	7.0	21.3
Mississippi.....	33.8	25.6	11.6	7.0	22.0

income States (table 3), reflecting the grant allocation formulas used for the Hill-Burton hospital construction program and public health programs.

For most States, the proportion of State aid to local governments does not affect the division of program responsibilities between State and local governments. Over the Nation, State aid to local governments for health and hospitals amounted to \$253 million, or 17 percent of local outlays for this function. In California, where local expenditures are a relatively high proportion of the total, State aid to localities is relatively low (7.5 percent). In contrast, in Wisconsin, where localities also make a high proportion of the health and hospital expenditures, State aid finances 30 percent of these expenditures. In several States where local expenditures are comparatively low (for example, Pennsylvania, Louisiana, and Kansas), State aid finances 20 to 30 cents of each \$1 of local expenditures.

In only three States (Massachusetts, Minnesota, and Washington) does the proportion of State aid exceed twice the national average. In two States (Delaware and Vermont) there is no State aid to local governments, and in 13 other States less than 5 percent of the local expenditures were financed by State aid.

Although the expenditures for health and hospitals according to the final spending unit are about evenly divided between State and local governments, local funds account for less than half (42 percent) of the total financing. The local share of funds ranges from 4 percent in Delaware to 75 percent in Nevada. In only three States in addition to Nevada (Iowa, New Jersey, and Wyoming) is the local share as much as 60 percent of the total. In 34 States, local funds account for less than half the total health and hospital expenditures.

The four governmental functions of education, highways, public welfare, and health and hospitals accounted for 71 percent of the total \$40.4 billion State-local general expenditures. The remaining 29 percent covered all the other functions of the State and local governments, such as police and fire protection, tax enforcement, legislative and judicial expense, sanitation, conservation of natural resources, recreation, correction, housing and community redevelopment, employment security administration, and interest on the general debt.

Education accounted for the largest proportion of State and local expenditures in all but two States; highway expenditures generally ranked second. Expenditures for public welfare and for health and hospitals usually ranked third and fourth. The States varied widely in the proportion of expenditures devoted to each function. Exclusive of the District of Columbia, education expenditures ranged from 45 percent of general expenditures in Utah to 24 percent in Massachusetts; highways varied from 33 percent in Connecticut to 13 percent in New York; public welfare, from 19 percent in Oklahoma to slightly less than 4 percent in Virginia; and health and hospitals, from 11 percent in New York to 3 percent in South Dakota.

Table 4 shows for each State the percentage distribution of the expenditures for the four major functions of State and local governments.

REFERENCES

- (1) U.S. Bureau of the Census: 1957 census of governments. State and local government finances in 1957. Advance Releases No. 8. February 1959, 76 pp.
- (2) U.S. Bureau of the Census: Compendium of State government finances in 1957. State finances: 1957. G-SF57-No. 2. Washington, D.C., U.S. Government Printing Office, 1958, 68 pp.

Legal note . . . Health Inspections

Constitutionality of ordinance imposing forfeiture on person refusing entry to health inspector without warrant upheld five to four in first decision by U.S. Supreme Court upon question—State court decisions noted. *Frank v. State of Maryland*, 79 S. Ct. 804 (May 4, 1959).

On February 27, 1958, Sanitarian Gentry, an officer of the bureau of rodent control of the Baltimore City Health Department, acting on a complaint that there were rats in the basement of a neighboring house, went to appellant Frank's private dwelling to make an inspection of the premises. Relying on the authority of section 120 of article 12 of the Baltimore City Code, Gentry did not have a search warrant. That section provides:

"Whenever the Commissioner of Health shall have cause to suspect that a nuisance exists in any house, cellar or enclosure, he may demand entry therein in the daytime, and if the owner or occupier shall refuse or delay to open the same and admit a free examination, he shall forfeit and pay for every such refusal the sum of Twenty Dollars."

Receiving no response to a knock at Frank's door, Gentry inspected the area outside the house and found a pile of straw, trash, and debris, including rodent feces, which he estimated at approximately one-half ton. When approached by Frank to explain his presence, Gentry said that he had evidence of rodent infestation and demanded entry into the house to inspect the basement area. Frank refused to permit entry without a search warrant. The next day Frank was arrested, charged with and found guilty of violating the quoted section of the Baltimore Code, and fined \$20. He appealed to the Maryland Court of Appeals which denied certiorari. (The issue presumably was considered settled by *Givner v. State of Maryland* (see below) in which the State Court had previously upheld the constitutionality of the Baltimore ordinance.)

The case was appealed to the Supreme Court of the United States, the appellant Frank charging that the conviction for resisting an inspection of his house without a warrant had been obtained in violation of the "due process" requirement of the 14th amendment to the Federal Constitution in that it violated his right against unreasonable searches and seizures as guaranteed in the fourth amendment to the Constitution. By a five-to-four decision sustaining the conviction the Supreme Court held the ordinance in question did not violate the due process requirements.

After analysis of the historical background of the 4th and 14th amendments, Justice Frankfurter speaking for the majority concluded that:

"... two protections emerge from the broad constitutional proscription of official invasion. The first of these is the right to be secure from intrusion into personal privacy, the right to shut the door on officials of the State unless their entry is under proper authority of law. The second, and intimately related protection, is self-protection: The right to resist unauthorized entry which has as its design the securing of information to fortify the coercive power of the State against an individual, information which may be used to effect a further deprivation of life or liberty or property."

Evidence of criminal action is placed in this second category and, except for limited situations, seizure of such evidence may not be had without a judicially issued search warrant. Here, however, the Court emphasized, no evidence for criminal prosecution was sought to be seized. The attempted inspection was merely

to determine whether conditions proscribed by the Baltimore health code existed, and if they did the owner or occupier would, under the ordinance, have been directed to correct them—to do what he could have been ordered to do even without an inspection. The Court noted that “appellant’s resistance can only be based, not on admissible self-protection, but on a rarely voiced denial of any official justification for seeking to enter his home. The constitutional ‘liberty’ that is asserted is the absolute right to refuse consent for an inspection designed and pursued solely for the protection of the community’s health, even when the inspection is conducted with due regard for every convenience of time and place.”

Thus, in addition to touching only the periphery of the important interests safeguarded by the 14th amendment’s protection against official intrusion—the right to be secure against unauthorized entry to secure evidence for possible criminal action—the inspection here is hedged with safeguards. Under the Baltimore Code, reasonable grounds for suspicion of the existence of a nuisance must exist, the inspection must be made in the daytime, and though a fine may be imposed for failure to allow an inspector in, officials may not enter forcibly.

The Court traced a long history of Maryland laws empowering inspections without warrants, and pointed to the 1801 ordinance of the City of Baltimore in which such a power of inspection became an instrument in the enforcement of the Baltimore health laws. Many thousands of inspections were made under this and similar authority, the Court noted, and the decision quoted with favor from an earlier opinion by Justice Holmes to stress the significance of this long history.

“The Fourteenth Amendment, itself a historical production, did not destroy history for the States and substitute mechanical compartments of law all exactly alike. If a thing has been practiced for two hundred years by common consent, it will need a strong case for the Fourteenth Amendment to affect it. . . .”

The Court, however, disavowed any intention by its holding to “freeze” due process “within the confines of historical facts or discredited attitudes.” The necessity for the exercise of the challenged power to inspect without a war-

rant was, however, viewed as still supported by the situation. The Court declared:

“There is a total want of important modification in the circumstances or the structure of the society which calls for a disregard for so much history. On the contrary, the problems which give rise to these ordinances have multiplied manifold, as have the difficulties of enforcement. The need to maintain basic, minimal standards of housing, to prevent the spread of disease and of that pervasive breakdown in the fiber of a people which is produced by slums and the absence of the barest essentials of civilized living, has mounted to a major concern of American government . . . Time and experience have forcefully taught that the power to inspect dwelling places, either as a matter of systematic area-by-area search, or as here, to treat a specific problem, is of indispensable importance to the maintenance of community health; a power that would be greatly hobbled by the blanket requirement of the safeguards necessary for a search of evidence of criminal acts.”

With respect to the view that the legal protection of privacy requires a search warrant in order to comply with “due process,” the Court rejected a suggestion that the warrant appellant considered necessary from a constitutional point of view could be satisfied by a blanket authorization “for periodic inspections.” The Court concluded that:

“If a search warrant be constitutionally required, the requirement cannot be flexibly interpreted to dispense with the rigorous constitutional restrictions for its issue. A loose basis for granting a search warrant for the situation before us is to enter by the way of the back door to a recognition of the fact that by reason of its intrinsic elements, its historic sanctions, and its safeguards, the Maryland proceedings requesting permission to make a search without intruding when permission is denied does not offend the protection of the Fourteenth Amendment.”

Concurring Opinion of Justice Whittaker

Justice Whittaker, in a separate opinion, concurred in the opinion of the Court, holding that the inspection involved did not amount

to an unreasonable search within the 4th and 14th amendments. He emphasized his understanding that the Court's opinion adhered to the principle that the prohibition of the 4th amendment against unreasonable searches applied to the States through the due process clause of the 14th amendment.

The Dissenting View

Justice Douglas, speaking for the minority, read the fourth amendment differently and declared: "The Court misreads history when it relates the Fourth Amendment primarily to searches for evidence to be used in criminal prosecutions." The security of one's privacy against arbitrary intrusion by the police protected by the fourth amendment, the dissent argued, does not exclude invasions for purposes of inspecting sanitary conditions. This would certainly be true with respect to those States where the presence of unsanitary conditions gives rise to criminal prosecutions. Even under the Baltimore City Code in question, since in resisting an attempt to make an inspection without a warrant appellant was invoking a constitutional protection, the imposition of any fine, regardless of amount, the dissent stated, is unconstitutional.

The dissent viewed the protection of the fourth amendment against unreasonable searches and seizures as designed to protect not only criminals, but as a reflection of the common-law right of a man to privacy in his home, unrelated to crime or suspicion of crime. They pointed to historical applications of this right in a wider frame of reference than only criminal prosecutions, and argued, further, that the more restricted application of the fourth amendment by the Court's decision had no basis in reason (quoting from, *District of Columbia v. Little*, 178 F. 2d 13, 17, affirmed on other grounds, 339 U.S. 1—see below): "To say that a man suspected of crime has a right to protection against search of his home without a warrant, but that a man not suspected of crime has no such protection, is a fantastic absurdity."

The dissent pointed out that the appellant sought to keep the inspector out only until a warrant was obtained. None was sought. In the view of the dissenters, the case was a poor

one to dispense with a need for a warrant since evidence necessary to obtain one was abundant—the extreme decay and the pile of filth. The dissent went on to say that the test of "probable cause" required by the fourth amendment before a search warrant may be issued may take into account the nature of the search being sought, for example, "considerations of health and safety." This approach, the opinion declared, was not to sanction synthetic search warrants but to recognize that the showing of a probable cause in a health case might have quite different requirements than one required in a graver situation.

State Decisions Noted

Although those cases were not before it, the Supreme Court decision in *Frank* reflects support for recent holdings of the Maryland and Ohio Supreme Courts. In *Givner v. State*, 210 Md. 484, 124 A. 2d 764 (1956), the Maryland Supreme Court, in upholding the constitutionality of the same Baltimore provision under attack in the *Frank* case, held that reasonable searches are not barred by the Federal or Maryland constitutions. An inspection without a warrant for the purpose of protecting the public health and safety, that court held, does not fall within the constitutional proscription against searches for evidence of crime. Under the ordinance in question, the court noted, and as the U.S. Supreme Court reemphasized in *Frank*, that the owner of a dwelling is ordered merely to correct the violations. Prosecution can only then be undertaken for failure to do so. The Maryland court concluded that the case fell within one of the suggested intermediate, constitutional areas in which governing agencies may lawfully provide for general routine inspections at reasonable hours without search warrants.

The Ohio Supreme Court made a similar determination with respect to a Dayton ordinance requiring the owner of a dwelling to grant free access thereto at any reasonable hour to a housing inspector for the purpose of conducting a health inspection in *State v. Price*, 151 N.E. 2d 523 (1958). In holding the ordinance constitutional the court noted that, under the provisions of the ordinance, before an owner could be forced to open his premises a court order would

have to be obtained. Similarly, where contemplated, prosecution for the violation of a final order would have to be based on evidence obtained at a reinspection, or at least at some time subsequent to the original inspection if it had been made without a warrant. Thus, the question of the use of evidence obtained without a warrant was held not before the court, and the issue was merely whether the inspection authorized by the ordinance constituted an unreasonable search.

In *District of Columbia v. Little*, 178 F. 2d 13 (D.C. Cir., 1949), the Circuit Court of Appeals in a two-to-one decision reversed a conviction under a District of Columbia law imposing a fine for a houseowner's "interference" with a health inspection and held that the fourth amendment prohibits such a search without a warrant. On appeal to the Supreme Court of the United States, the *Little* decision was

affirmed, 339 U.S. 1 (1950), but on nonconstitutional grounds, the Court determining that defendant's action in refusing entry did not constitute an "interference" within the meaning of the applicable District of Columbia Act.

NOTE: On June 8, 1959, 79 S. Ct. 978, by a vote of four to four (one Justice abstaining) the Supreme Court of the United States noted probable jurisdiction in *State ex rel Eaton v. Price* (discussed under "State decisions" above). As pointed out in the memorandum by Justice Clark (who objected to this action), this case is apparently "on all fours" with the *Frank* case "except that the penalty provision in Maryland's Act is \$20, while that of Ohio's law is a maximum of \$200, or a jail sentence not exceeding 30 days." The case will probably be set for argument in the 1959-1960 term of the Court.

—SIDNEY EDELMAN, assistant chief, Public Health Division, Office of General Counsel, Department of Health, Education, and Welfare.

Correction

In the paper, "Poliomyelitis in the United States, 1957," *Public Health Reports*, vol. 74, June 1959, p. 536, table 1 should be replaced by the following:

Table 1. Total national poliomyelitis incidence, 1935-57

Year	Cases	Rate per 100,000	Year	Cases	Rate per 100,000
1935.....	10,839	8.5	1947.....	10,827	7.5
1936.....	4,523	3.5	1948.....	27,726	19.1
1937.....	9,514	7.4	1949.....	42,033	28.4
1938.....	1,705	1.3	1950.....	33,300	22.0
1939.....	7,343	5.6	1951.....	28,386	18.6
1940.....	9,804	7.4	1952.....	57,879	37.2
1941.....	9,086	6.8	1953.....	35,592	22.5
1942.....	4,167	3.0	1954.....	38,476	23.9
1943.....	12,450	9.3	1955.....	28,985	17.6
1944.....	19,029	14.3	1956.....	15,140	9.1
1945.....	13,624	10.3	1957.....	5,485	3.2
1946.....	25,698	18.4			

SOURCES: Reported cases, 1935-50, from U.S. National Office of Vital Statistics: Vital Statistics—Special Reports, vol. 37, No. 9, June 15, 1953; 1951-57, from U.S. National Office of Vital Statistics: Annual Supplement, Morbidity and Mortality Weekly Report, vol. 6, No. 53, Oct. 29, 1958, p. 4, table 1. Rates based on Bureau of the Census mid-year population estimates.

Milk Sanitation Honor Roll for 1957-59

Fifty communities have been added to the Public Health Service milk sanitation "honor roll," and 64 communities on the previous list have been dropped. This revision covers the period from July 1, 1957, to June 30, 1959, and includes a total of 289 cities and 97 counties.

Communities on the honor roll have complied substantially with the various items of sanitation contained in the milk ordinance recommended by the U.S. Public Health Service (PHS Publication No. 229: "Milk Ordinance and Code—1953 Recommendations of the Public Health Service"). The State milk sanitation authorities concerned report this compliance to the Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk are sold.

The recommended milk ordinance, on which the milk sanitation ratings are based, is now in effect through voluntary adoption in 490 counties and 1,424 municipalities. The ordinance also serves as the basis for the regulations of 35 States and Hawaii. In 15 States and Hawaii it is in effect statewide.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as stated in the recommended ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication

This compilation is from the Milk and Food Program, Division of Engineering Services of the Bureau of State Services, Public Health Service. The previous listing was published in Public Health Reports, March 1959, pp. 277-280. The rating method was described in Public Health Reports 53: 1386 (1938); reprint No. 1970.

of the list is intended to encourage communities operating under the recommended ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they are more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

The rules for inclusion of a community on the honor roll are:

1. All ratings must be determined by the State milk sanitation authority in accordance with the Public Health Service rating method, which is based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service recommended milk ordinance. (A departure from the method described consists of computing the pasteurized milk rating by weighting the pasteurization plant rating twice that of the raw milk intended for pasteurization.)

2. No community will be included on the list unless both its pasteurized milk and its retail raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the retail raw milk rating is 90 percent or more.

3. The rating used will be the latest submitted to the Public Health Service, but no rating will be used which is more than 2 years old. (In order to promote continuous rigid enforcement rather than occasional "cleanup campaigns," it is suggested that, when the rating of a community on the list falls below 90 percent, no resurvey be made for at least 6 months. This will result in the removal of the community from the subsequent semiannual list.)

4. No community will be included on the list whose milk supply is not under an established program of official routine inspection and laboratory control provided by itself, the county, a milk-control district, or the State. (In the absence of such an official program, there can be no assurance that only milk from sources rating 90 percent or more will be used continuously.)

5. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. (If the check rating is less than 90 percent, but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary period shows a rating of 90 percent or more. If the check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for 2 years from the date of the check survey, unless a subsequent rating during this period warrants its removal.)

Communities awarded milk sanitation ratings of 90 percent or more, July 1957-June 1959

100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Colorado</i>		<i>Indiana—Continued</i>		<i>Kentucky—Continued</i>	
Boulder County.....	8-1958	Holland.....		Glasgow.....	1-17-1959
Colorado Springs.....	12-13-1957	Huntingburg.....		Greenville.....	1-21-1958
Denver.....	8-27-1957	Jasper.....		Hardinsburg and Breck-	
Las Animas-Huerfano		Tell City.....		inridge County.....	10-22-1958
Counties.....	4-22-1958	Elkhart, Goshen, Nappa-		Hodgenville.....	10-20-1958
Pueblo County.....	2-13-1958	nee area.....	12-5-1957	Hopkinsville and Chris-	
Weld County.....	10-24-1957	Evansville.....	6-5-1958	tian County.....	9-26-1957
<i>District of Columbia</i>		Fort Wayne.....	7-15-1958	Lawrenceburg and An-	
Washington.....	3-6-1958	Indiana Falls City		derson County.....	6-5-1958
<i>Georgia</i>		area:.....	10-16-1957	Leitchfield and Grayson	
Albany.....	12-5-1958	Jeffersonville.....		County.....	10-10-1957
Athens.....	5-8-1959	New Albany.....		Liberty.....	11-18-1958
Atlanta.....	8-23-1957	Salem.....		Louisville and Jefferson	
Augusta.....	5-23-1959	Scottsburg.....		County.....	3-1958
Bainbridge.....	3-25-1958	Lafayette and W. Lafay-		Mayfield and Graves	
Cairo.....	5-7-1958	ette.....	5-5-1958	County.....	5-6-1959
Calhoun-Gordon County..	8-12-1958	Logansport.....	3-27-1958	Maysville.....	7-23-1957
Canton.....	10-30-1958	Madison.....	7-23-1958	Monticello.....	6-19-1958
Columbus.....	1-23-1959	Marion County.....	4-2-1958	Morehead.....	2-3-1959
Douglas County.....	7-25-1958	Michigan City.....	4-23-1958	Morganfield and Union	
Fitzgerald.....	5-27-1959	Monticello.....	10-16-1958	County.....	1-21-1958
Griffin.....	11-14-1957	Muncie.....	5-20-1958	Morgantown.....	1-10-1958
La Grange.....	12-8-1958	New Castle.....	4-24-1958	Murray and Calloway	
Moultrie.....	10-29-1958	North Manchester.....	12-16-1958	County.....	2-5-1958
Paulding County.....	7-25-1958	Peru.....	10-30-1958	Newport and Campbell	
Quitman.....	8-13-1958	Rochester.....	9-17-1958	County.....	10-18-1957
Savannah.....	7-18-1958	South Bend.....	12-11-1957	Owensboro.....	5-9-1958
Valdosta.....	3-12-1958	Union City.....	7-3-1957	Owenton.....	3-31-1958
Waycross.....	3-14-1958	Vincennes.....	10-3-1957	Paducah and McCracken	
<i>Illinois</i>		Warsaw.....	8-15-1958	County.....	5-1-1959
East Side Health Dis-		<i>Iowa</i>		Paris and Bourbon	
trict:.....	6-5-1958	Cedar Rapids.....	10-9-1958	County.....	1-1958
Brooklyn.....		Davenport.....	7-24-1958	Pendleton County.....	4-2-1958
Cahokia.....		Des Moines.....	7-3-1958	Pike County.....	7-22-1958
East St. Louis.....		Dubuque.....	6-20-1958	Prestonsburg and Floyd	
Fairmont City.....		Frankfort.....	2-10-1959	County.....	7-22-1958
National City.....		Iowa City.....	10-9-1958	Shelby County.....	1-17-1958
Washington City.....		Kokomo.....	2-10-1959	Smithland and Living-	
Elgin.....	9-19-1958	<i>Kentucky</i>		ston County.....	2-7-1958
Peoria.....	4-17-1958	Benton and Marshall		Taylorsville and Spencer	
<i>Indiana</i>		County.....	2-6-1958	County.....	6-30-1958
Anderson.....	12-3-1958	Bowling Green and War-		Webster County.....	5-22-1958
Berne-Bluffton area....	10-17-1958	ren County.....	5-14-1959	<i>Mississippi</i>	
Bloomington.....	1-10-1958	Butler and Falmouth....	4-2-1958	Amory.....	5-7-1959
Bremen.....	1-29-1958	Campbellsville.....	2-13-1959	Booneville.....	5-6-1959
Columbia City.....	6-20-1958	Cynthiana and Harrison		Brookhaven.....	1-15-1958
Cooperative Grade A		County.....	4-8-1958	Canton.....	9-30-1958
area:.....	2-13-1958	Danville and Boyle		Clarksdale.....	12-17-1958
		County.....	4-1958	Columbia.....	8-7-1958
		Elizabethtown.....	1-8-1958	Columbus.....	7-16-1958
		Frankfort.....	10-18-1957	Corinth.....	4-9-1959
				Greenville.....	10-21-1958

Communities awarded milk sanitation ratings of 90 percent or more, July 1957-June 1959—Con.

100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Mississippi—Continued</i>		<i>North Carolina—Continued</i>		<i>Tennessee—Continued</i>	
Grenada	9-24-1957	Hertford County	7-31-1958	Kingsport	1-30-1958
Hattiesburg	5-16-1958	Iredell County	7- 1-1958	Knoxville-Knox County ..	9-25-1957
Hernando	12-19-1958	Jackson County	3-19-1959	Lewisburg	6- 9-1958
Houston	4-15-1959	Lenoir County	4- 7-1959	Lexington	10-30-1958
Iuka	4- 8-1959	Lincoln County	1- 9-1959	Livingston	1- 7-1959
Jackson	3-26-1959	Macon County	3-19-1959	Loudon	5-26-1958
Kosciusko	6-12-1958	Martin County	8-13-1958	Manchester	10-15-1958
Laurel	5-20-1958	Mecklenburg County	3- 7-1958	Memphis	3-24-1958
Louisville	8-18-1958	Moore County	5-15-1958	Milan	11-11-1958
Macon	2-26-1958	New Hanover County	4-21-1958	Morristown	7-10-1958
Meadville	2-25-1959	Northampton County	7-31-1958	Mountain City	10-28-1958
Meridian	2-27-1958	Orange County	8-13-1957	Mount Pleasant	5-19-1958
New Albany	10-10-1957	Pasquotank County	5- 2-1958	Murfreesboro	8-14-1957
Oxford	8-27-1957	Pender County	3- 2-1959	Nashville-Davidson Coun-	
Picayune	10-30-1957	Perquimans County	5- 2-1958	ty	10-28-1957
Starkville	2-10-1959	Person County	8-13-1957	Newbern	11-18-1958
State College	2-11-1959	Pitt County	4- 1-1958	Newport	1- 7-1958
Tupelo	1-27-1959	Richmond County	7-30-1958	Paris	9- 4-1958
Vicksburg	1-27-1959	Rocky Mount	2-27-1958	Pulaski	9-12-1957
West Point	7-15-1958	Sampson County	5-22-1958	Rogersville	1-29-1958
<i>Missouri</i>		Scotland County	11-22-1957	Sparta	4-18-1958
Kansas City	6-11-1958	Stanley County	9-10-1958	Sweetwater	9-23-1958
St. Joseph	4-14-1958	Swain County	3-19-1959	Trenton	11- 5-1958
St. Louis	11-26-1957	Transylvania County	10-20-1958	Tullahoma	10-13-1958
St. Louis County	6- 4-1958	Tyrrell County	2- 6-1958	Waverly	8-26-1958
Sedalia	8- 7-1957	Union County	12- 4-1958	Winchester	10-16-1958
Sikeston	2-11-1958	Washington County	2- 6-1958		
Springfield	5-13-1958	Wayne County	1-27-1958	<i>Texas</i>	
		Wilson County	1-27-1958	Amarillo	4-14-1959
<i>Nebraska</i>		<i>Ohio</i>		Big Springs	12-14-1957
Lincoln	7-16-1958	Lima	10- 1-1957	Borger	6-27-1958
Omaha	2-19-1958			Bryan	10- 5-1957
<i>New Mexico</i>		<i>Tennessee</i>		Burkburnett	1-14-1958
Albuquerque	9-11-1958	Athens	9-25-1958	Cleburne	1-17-1958
<i>North Carolina</i>		Bristol	11- 7-1957	College Station	10- 5-1957
Alexander County	1- 9-1959	Chattanooga - Hamilton		Corpus Christi	5-11-1959
Beaufort County	5-14-1959	County	10- 9-1958	Dallas	11-17-1958
Bertie County	2- 7-1958	Clarksville	2- 7-1958	Denison	10-30-1957
Bladen County	4- 9-1958	Cleveland	5- 8-1958	Edinburg	3-14-1958
Camden County	5- 2-1958	Clinton	9-16-1958	El Paso	2-13-1958
Catawba County	1- 9-1959	Columbia	5-19-1958	Falfurrias	2-15-1958
Chatham County	8-13-1957	Cookeville	4-18-1958	Galveston	6-27-1958
Chowan County	5- 2-1958	Covington	12-12-1958	Grand Prairie	11-28-1958
Craven County	8-30-1957	Cowan	10-16-1958	Greenville	12-12-1958
Cumberland County	3-28-1958	Decherd	10-16-1958	Harlingen	2-15-1958
Durham County	4-22-1958	Dyersburg	11-18-1958	Houston	6-13-1958
Edgecombe County	5-21-1958	Erwin	10-30-1958	Jacksonville	12-17-1958
Forsyth County	12-12-1958	Fayetteville	6-10-1958	Kingsville	5- 6-1959
Gates County	7-31-1958	Franklin	5-15-1958	Lubbock	8-14-1958
Guilford County	6-18-1958	Greeneville	1-28-1958	Lufkin	7- 9-1958
Halifax County	9-13-1957	Humboldt	11- 5-1958	McAllen	3-14-1958
Harnett County	10-15-1958	Huntingdon	10-28-1958	Midland	12-14-1957
Haywood County	3-14-1958	Jackson-Madison Coun-		Odessa	12-14-1957
Henderson County	10-20-1958	ty	10-14-1958	Paris	2- 4-1959

Communities awarded milk sanitation ratings of 90 percent or more, July 1957-June 1959—Con.

100 PERCENT OF MARKET MILK PASTEURIZED

<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>	<i>Community</i>	<i>Date of rating</i>
<i>Texas—Continued</i>		<i>Virginia—Continued</i>		<i>Wisconsin—Continued</i>	
Plainview	10- 8-1958	Christiansburg	8- 7-1958	Burlington	12-11-1958
Port Arthur	10-23-1957	Colonial Heights	11- 7-1958	Clintonville	2-11-1958
San Angelo	8- 8-1957	Lynchburg	4-14-1959	Delavan	12-11-1958
San Antonio	3- 6-1959	Norfolk	6- 5-1958	Eau Claire	2- 3-1959
San Benito	2-12-1958	Petersburg	11- 7-1958	Elkhorn	12-11-1958
Sherman	10-31-1957	Portsmouth	3-27-1959	Fontana	12-11-1958
Texarkana	12-10-1957	Pulaski	8- 7-1958	Fort Atkinson	12-11-1958
Tyler	9-26-1958	Radford	8- 7-1958	Green Bay	10-11-1957
Victoria	1-19-1959	Richmond	4-18-1958	Kaukauna	1- 6-1959
Wichita Falls	12-16-1958	Roanoke	7- 3-1958	Kenosha	7- 5-1957
		Staunton	4- 4-1958	La Crosse	8-26-1958
		Waynesboro	12- 5-1957	Lake Geneva	12-11-1958
<i>Utah</i>				Madison	11-29-1957
Logan	5-22-1958	<i>Washington</i>		Milwaukee	8-28-1957
Ogden	10-30-1957	Spokane	10-29-1958	Neenah-Menasha	12- 2-1958
Salt Lake City	5- 6-1958	Whitman County	10-17-1958	Oshkosh	7- 9-1958
Utah County	11-29-1957			Ripon	2-13-1959
		<i>Wisconsin</i>		Sheboygan	7-26-1957
<i>Virginia</i>		Appleton	1-13-1959	Stevens Point	2-19-1959
Abingdon	11- 7-1957	Beaver Dam	2-13-1959	Waupun	2-13-1959
Blacksburg	8- 7-1958	Beloit	1-23-1958	Williams Bay	12-11-1958
Bristol	11- 7-1957				

BOTH RAW AND PASTEURIZED MARKET MILK

<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>	<i>Community and percent of milk pasteurized</i>	<i>Date of rating</i>
<i>Georgia</i>		<i>Missouri</i>		<i>Texas</i>	
Americus, 94.9	8-25-1958	Joplin, 91.4	2- 5-1958	Abilene, 90	10-10-1957
Carrollton, 99.8	2-12-1959			Brenham, 95.5	7-11-1958
Cedartown, 96.9	8-31-1957	<i>North Carolina</i>		Brownsville, 98.7	3-12-1958
Gainesville, 95.6	9-19-1958	Buncombe County, 98.7	4- 1-1958	Hereford, 96	3-27-1959
Rome, 99.1	10-16-1957	Cleveland County, 91.8	9-11-1958	Marshall, 98.8	4-23-1959
Thomasville, 96.3	6-24-1958	Gaston County, 97.9	7-19-1957	Palestine, 99.2	10- 2-1957
Toccoa, 97.4	12-19-1958	Robeson County, 98	3-11-1958		
Washington, 99.87	2-25-1959	Wake County, 99.9	1-27-1958	<i>Virginia</i>	
		Wilkes County, 99.48	5- 8-1958	Charlottesville, 99.6	9-27-1957
<i>Kentucky</i>				<i>Washington</i>	
Madisonville and Hopkins County, 99	12-11-1958	<i>Oklahoma</i>		Benton and Franklin Counties, 99.7	9-25-1958
Somerset and Pulaski County, 96	8-29-1958	Lawton, 99.5	1-15-1959		
		<i>Tennessee</i>		<i>West Virginia</i>	
<i>Mississippi</i>		Harriman, 95	4- 2-1958	Kanawha County, 99.3	8-29-1958
Biloxi, 99	3-28-1958	Kingston, 96.5	4- 2-1958	Monongalia County, 97.8	8- 9-1957
Gulfport, 99	3-27-1958				

NOTE: In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90 percent or more compliance with the grade A raw

milk requirements, of the milk ordinance recommended by the United States Public Health Service.

Notice particularly the percentage of the milk pasteurized in the various communities listed. This percentage is an important factor to

consider in estimating the safety of a city's milk supply. All milk should be pasteurized, whether commercially or at home, before it is consumed.

EXPERIMENTAL LYMPHOCYTIC CHORIOMENINGITIS OF MONKEYS AND MICE PRODUCED BY A VIRUS ENCOUNTERED IN STUDIES OF THE 1933 ST. LOUIS ENCEPHALITIS EPIDEMIC

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In the transmission from monkey to monkey of infectious materials derived from a fatal case of the 1933 St. Louis epidemic of encephalitis, a virus has been encountered apparently quite distinct from the strains previously isolated in monkeys by Muckenfuss, Armstrong, and McCordock, and subsequently in white mice by Webster and Fite. This virus, which differs from any virus with which the author is familiar, will be designated in this paper, from the pathological picture produced by intracerebral inoculation of monkeys and mice, as the virus of experimental lymphocytic choriomeningitis.

ORIGIN OF THE VIRUS

The virus was encountered during monkey-to-monkey transfer of infection from a patient C.G., who died during the 1933 St. Louis epidemic of what was apparently encephalitis of the type prevailing there, as judged by the symptoms and central nervous system pathology.

HISTORY OF CASE

Case C.G., colored housewife, 42 years of age, resident of St. Louis County, had been in poor health for the preceding 12 years; suffered with chronic constipation and had had an abdominal operation; was said to suffer from diabetes. She had been in usual health during 3 weeks prior to present illness, which began on August 13, 1933, with general malaise—"just sick all over."

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Dr. Charles Armstrong describes for the first time a neurotrophic virus, quite distinct from the 1933 strains of St. Louis encephalitis, but encountered during experimental transmission of those strains. Dr. R. D. Lillie describes the pathology produced by the virus in monkeys and mice.